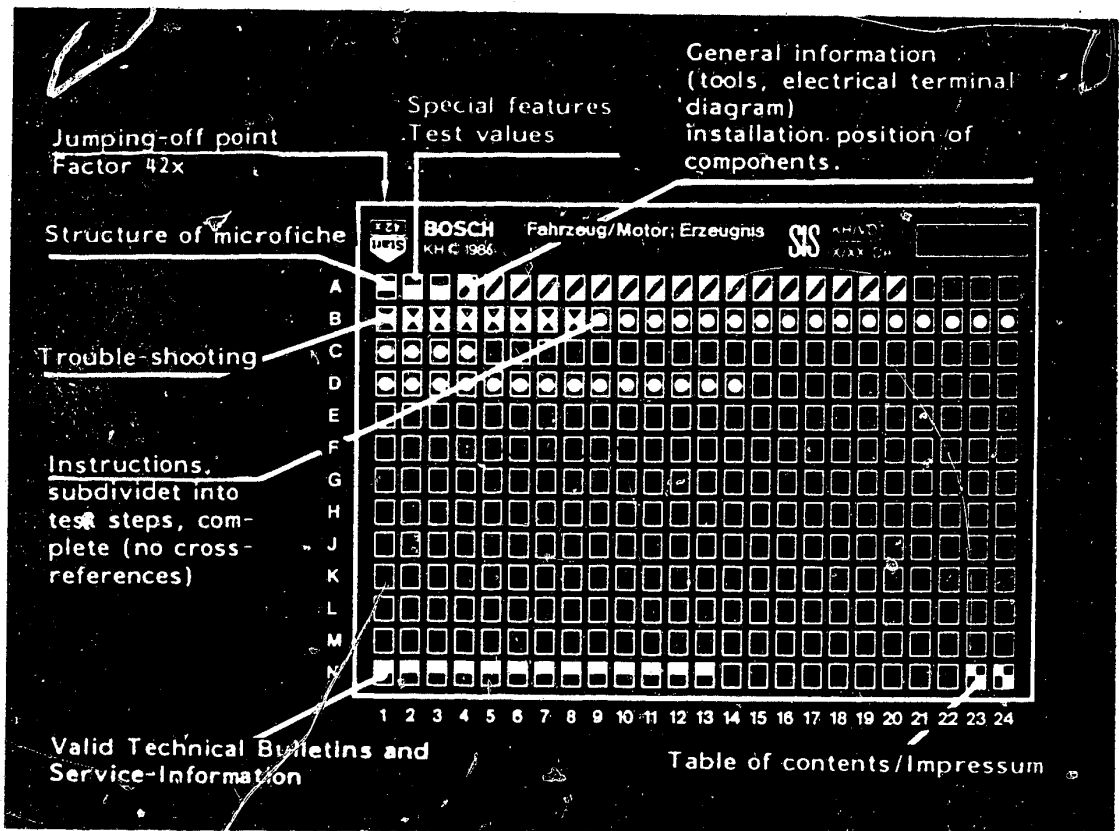


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

E16	Product/component/test step
	Vehicle/engine

Coordinate

3. Limits of section

Beginning	Mid-section	End	One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

A1	Trouble-shooting program	
-----------	--------------------------	--

1. Special features

This microcard concerns the Alfa 90, 2.0 l
(carburetor) from 10.84, Switzerland version with EZ.

Vehicle is equipped with:

Trigger box	0 227 100 111 (with current limitation)
Ignition coil	1 227 020 010
Spark-advance unit	0 227 921 018

2. Test specifications

Ignition coil, primary	0.7...1.2 Ω
Ignition coil, secondary	6.9...11.9 k Ω

B11**B17**

Coolant-temperature switch	< approx. +35°C approx. U_B > approx. +41°C 0 V
-------------------------------	---

Basic ignition setting at engine idle, engine oil > +60°C and without vacuum	5 \pm 1° n. OT
---	------------------

B19

Engine-idle nominal value	755...915 min ⁻¹
------------------------------	-----------------------------

In order to avoid
incorrect settings,
testing must be
carried out per
coordinate information.

C1**A2**

Special features, test specifications
Alfa Romeo



Supply voltage
trigger box
at engine idle

12. 14 V

C3

Supply voltage
Ignition coil
at engine idle

≥ 10 V

Primary voltage at
engine idle

295...365 V

C5

Supply voltage
Ignition pulse
generator

≥ 10 V

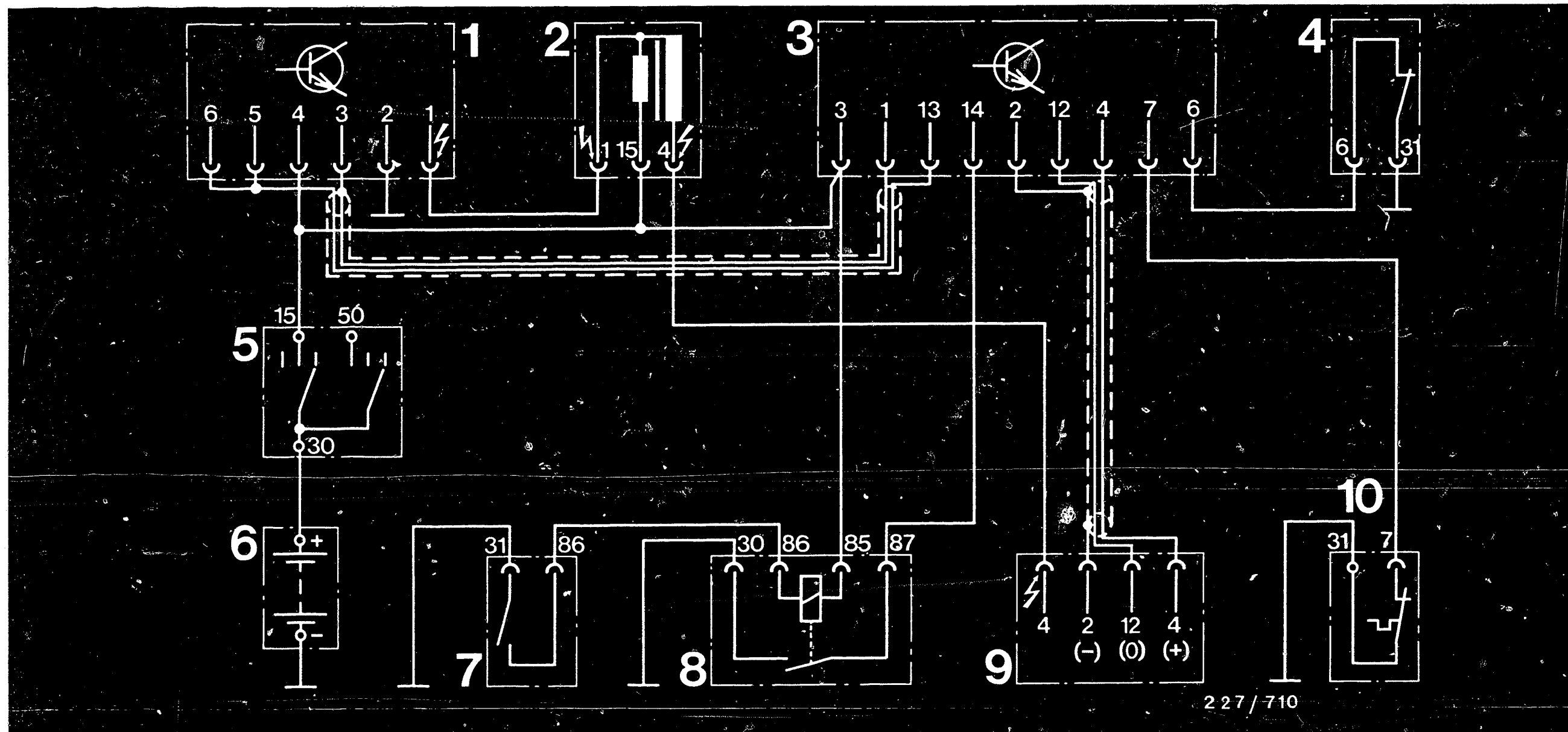
D5

For adjustment values for ignition, exhaust, valve
play etc., see Autodata test specifications.

A3

Test specifications
Alfa Romeo





High-voltage arrows:
Caution, 400 V ... 25 kV

1 = Trigger box
2 = Ignition coil
3 = Spark-advance unit
4 = Idle switch

5 = Ignition and starting switch
6 = Battery
7 = Full-load switch
8 = Relay characteristic-curves actuation

9 = Ignition distributor
10 = Coolant-temperature switch

3. Electrical terminal diagram

A4

Electrical terminal diagram

Alfa Romeo

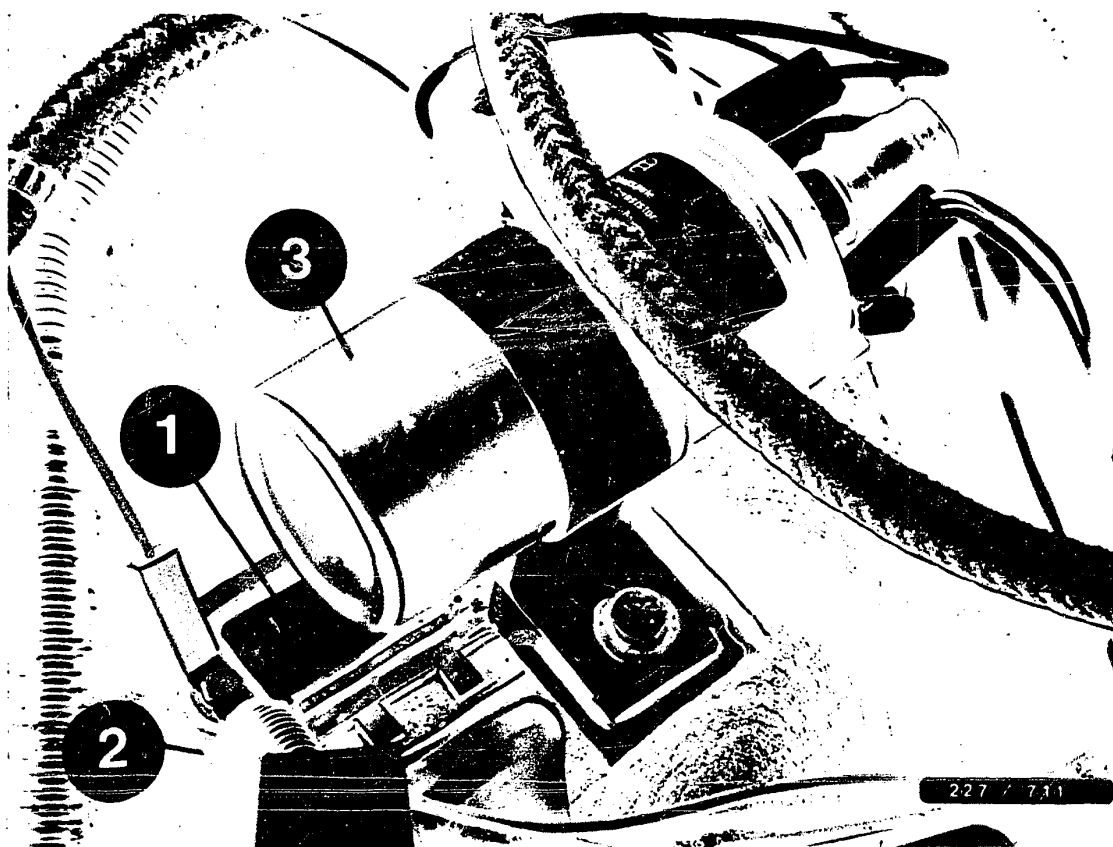


A5

Electrical terminal diagram

Alfa Romeo



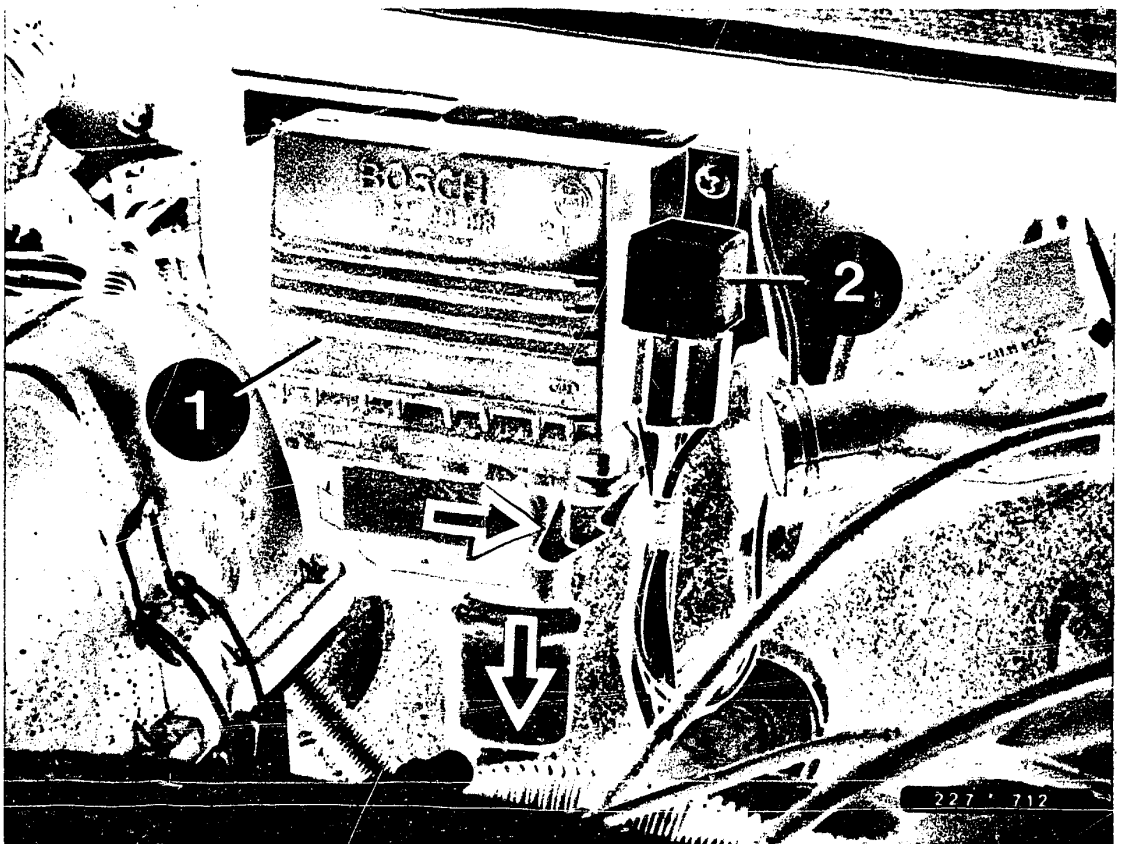


- 1 = Transistorized ignition trigger box
- 2 = Heat sink
- 3 = Ignition coil

4. Installation position of components

Trigger box and ignition coil are mounted on a common heat sink (on wheel well to the right).





1 = Spark-advance unit

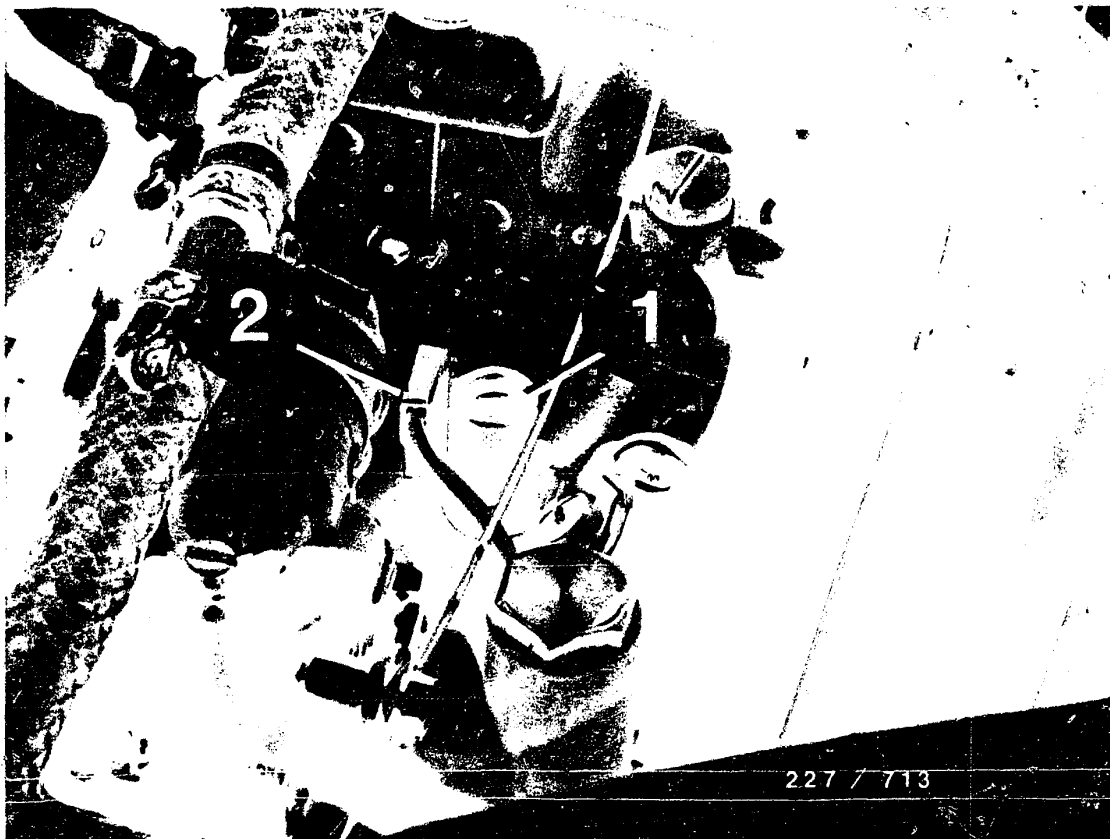
2 = Relay characteristic-curves actuation

Spark-advance unit and relay for characteristic-curves actuation are located below in the engine compartment. See illustration.

Instructions for removal:

Remove firewall panel. Press spark-advance unit plug detent in direction of arrow, pivot plug in direction of arrow.





- 1 = Idle switch
- 2 = Idle-switch plug

The idle switch is located on the rear carburetor.





Arrow = Full-load switch

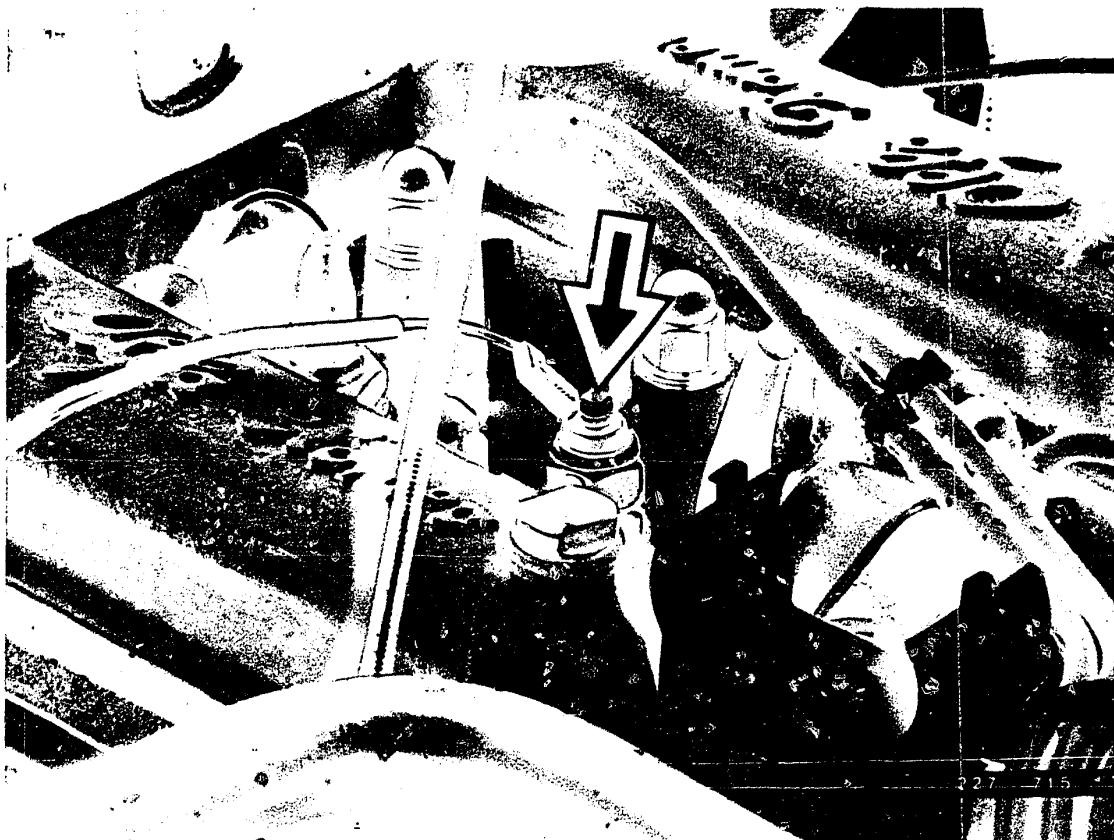
The full-load switch is located on the front carburetor. See illustration.

A9

Installation position of components

Alfa Romeo





Arrow = Coolant-temperature switch

The coolant-temperature switch is located on the cylinder head. See illustration.

A10

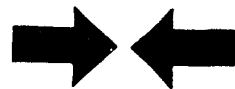
Installation position of components

Alfa Romeo



5. Required testing and auxiliary equipment

Motortester, e.g.	MOT 201	0 684 000 201
Ignition-pulse-shaping circuit (required for measuring primary voltage at MOT 201, 202, and 400).		1 684 463 154
Spark gap, e.g. ignition-coil capacitor tester or simple spark gap	EFAW 106 A EF 1177/7	0 681 100 001 1 684 531 000
Sleeve-type suppressor 5 k Ω		0 356 500 001
Ohmmeter e.g.	ETE 014.00	0 684 101 400
or e.g.	Pontavi Wh2	commercially available
Voltmeter e.g.	ETE 014.00	0 684 101 400
Thermal conduction paste		5 942 860 003
Test leads (for proper connection of test equipment to plug connectors)		KDZS 0004
Test prods (for correct connection of test equipment to plug connections)		commercially available



6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts of terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

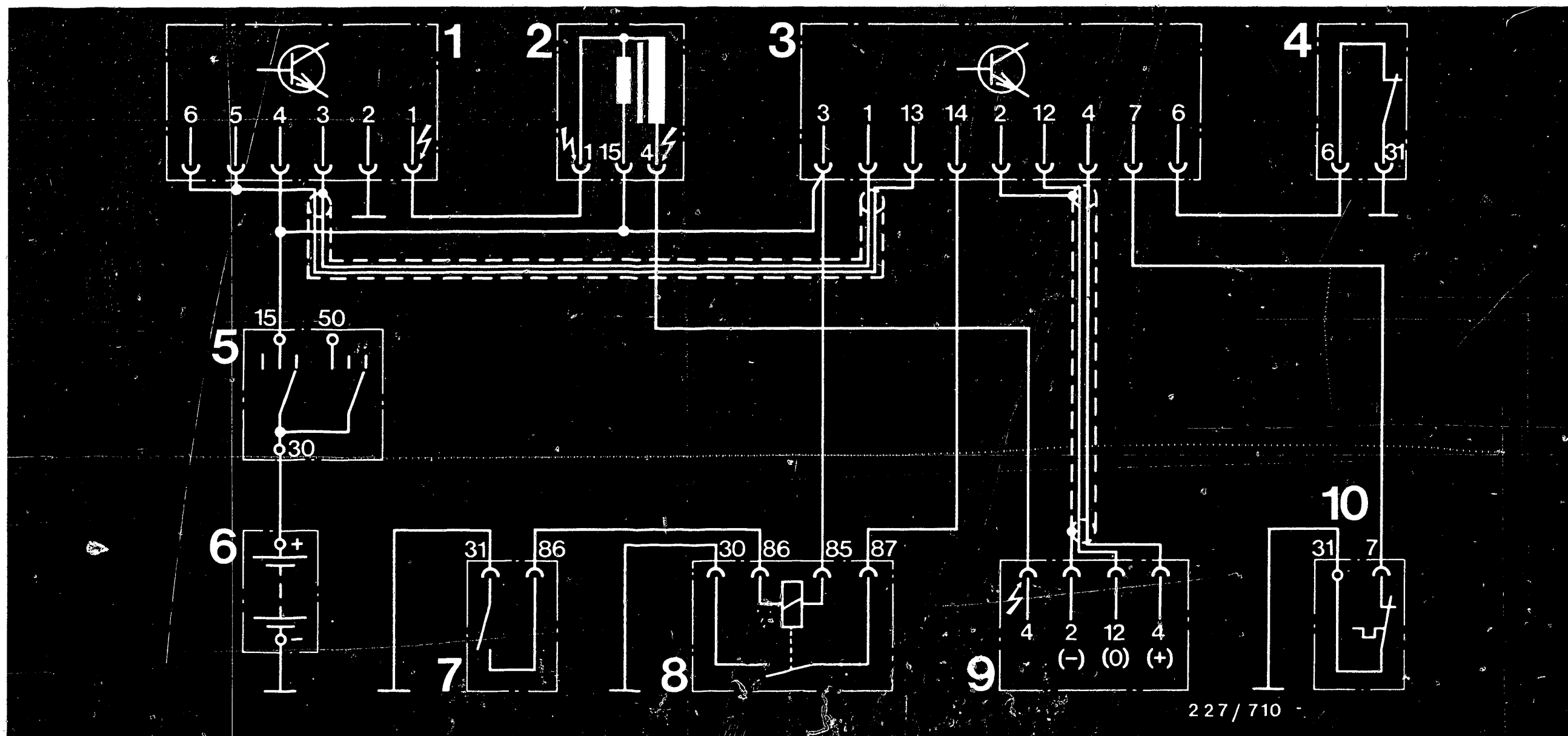
- Connecting of engine test equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc.).



If it is necessary to switch on ignition (switching on or connecting ignition or voltage source) when testing the ignition system or undertaking engine adjustments (e.g. fuel induction), the hazardous voltages specified are present in the entire system.

The danger of accident exists, therefore, not only on the individual assemblies of the ignition system (e. g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e. g. tachometer connection, diagnostic plug), at plug-in connections and test equipment.





High voltage arrows:
Caution, 400 V ... 25 kV

1 = Trigger box
2 = Ignition coil
3 = Spark-advance unit
4 = Idle switch

5 = Ignition and starting switch
6 = Battery
7 = Full-load switch
8 = Characteristic-curve actuation relay

9 = Ignition distributor
10 = Coolant-temperature switch

Electrical terminal diagram

On this terminal diagram of an electronic ignition system the hazardous points are identified with the high-voltage arrows.

A14

Accident hazard
Alfa Romeo



A15

Accident hazard
Alfa Romeo



7. Incorrect indication of engine speed, dwell angle
and ignition point

In ignition systems with trigger box 0 227 100 111
(TZ) with current limitation there may be an incorrect
indication of engine speed, dwell angle and ignition
point on testers.

For further details see coordinates N 8 - N 12.

A16

Incorrect indication of testers

Alfa Romeo



8. Important vehicle information

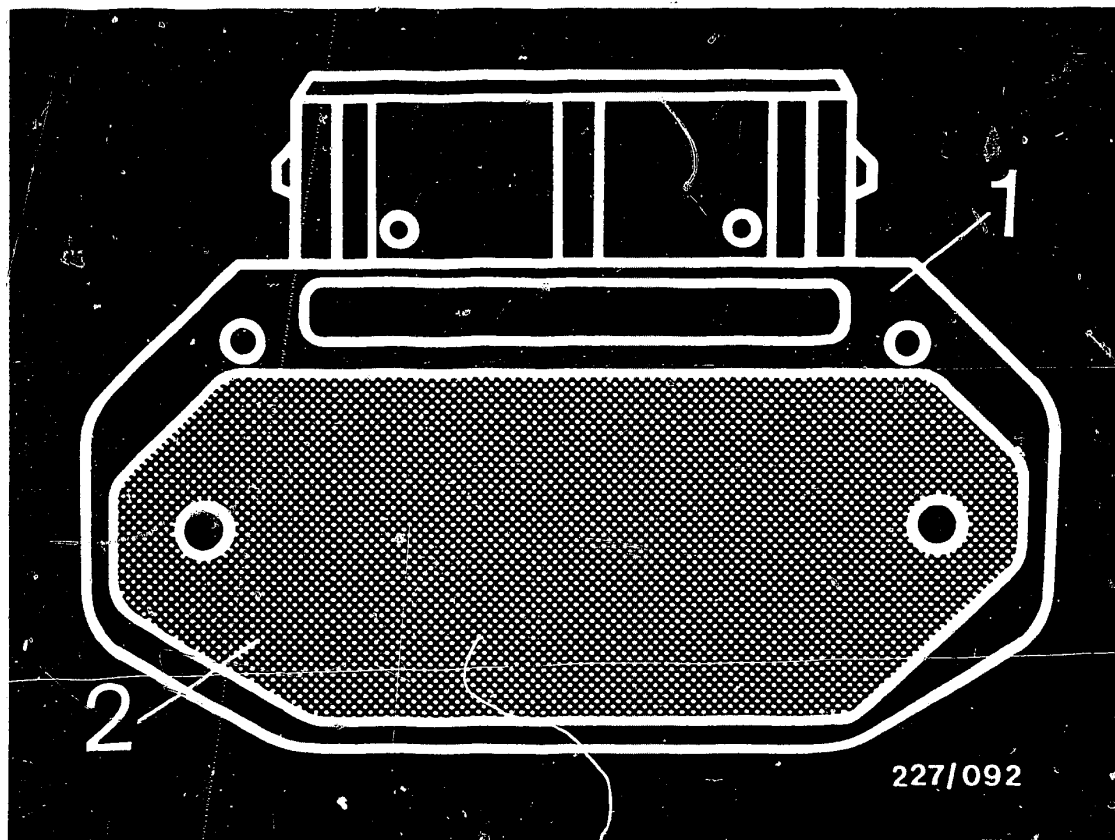
- Resistance measurements must be performed only with the ignition switched off or with the battery disconnected (risk of measuring instrument defect).
- During the compression test, either pull off the trigger-box plug or firmly connect terminal 4 of the ignition coil to ground using an extra cable (risk of dangerous voltages, insulation damage at ignition coil, ignition distributor or ignition harness).

Note:

The auxiliary cable must be suppressed with at least 2 k Ω , e.g. with the interference suppression sleeve (5 k Ω) 0 356 500 001.

- The specified ignition coil (see Part No.) must not be replaced by another ignition coil.
- No suppression capacitor may be connected to ignition coil term. 1.
- Ignition coil terminal 1 must not be connected to ground as an anti-theft device (when the ignition is switched on, the ignition coil will be destroyed).
- A positive battery terminal or test lamp must not be connected to ignition coil terminal 1 (trigger box will be destroyed).
- The ignition lead from ignition coil terminal 4 to ignition distributor terminal 4 must not be disconnected while the engine is running.
- There must be no voltage flashover from ignition coil term. 4 to ignition term. 1 and term. 15, as the ignition-pulse generator and trigger box could be destroyed.





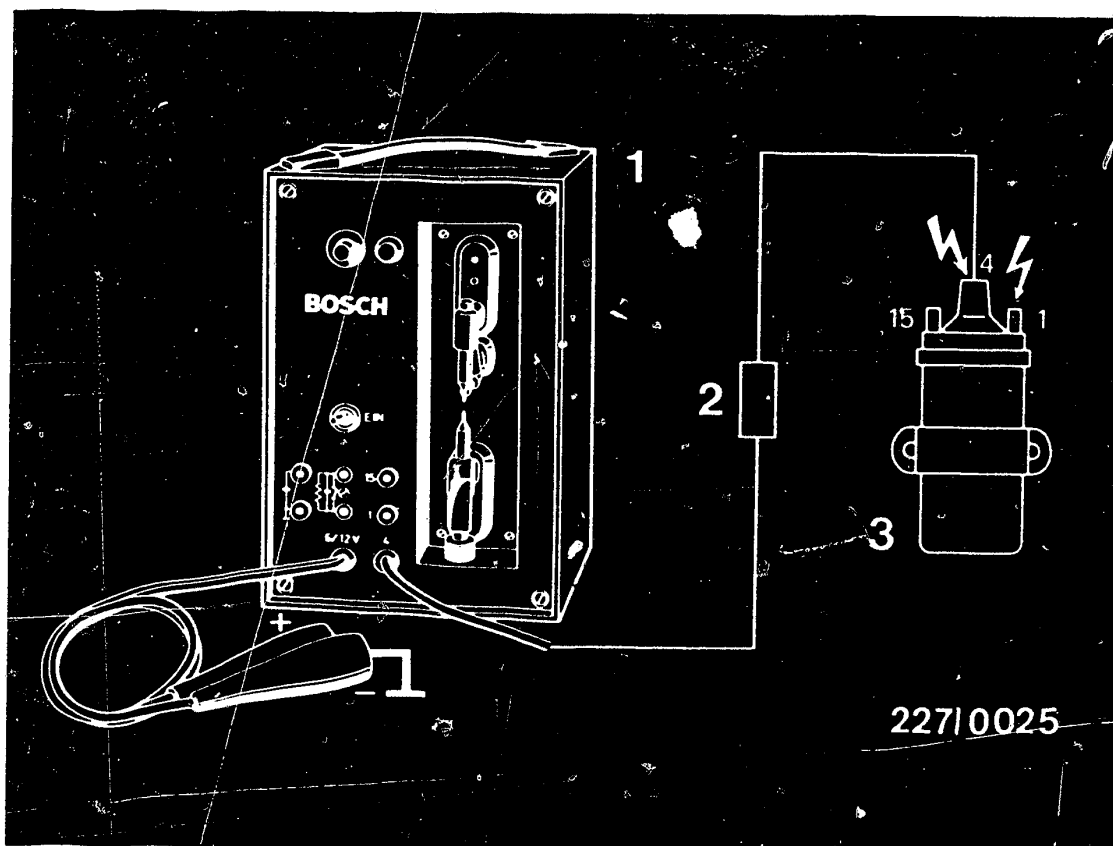
1 = Trigger box

2 = Base plate

- Before mounting the trigger box, the base plate must be coated with thermal conduction paste. Apply thermal conduction paste only with a suitable object (screwdriver, matchstick etc.)

Do not apply thermal conduction paste to painted parts.





- 1 = Spark gap
- 2 = 5 k Ω sleeve-type suppressor
- 3 = Ignition coil

High voltage arrows:
Caution, 400 V ... 25 kV

- In order to prevent the trigger box from being irreparably damaged, when using a spark gap, an interference-suppression resistor of at least 2 k Ω must be connected between the spark gap and ignition coil terminal 4, e. g. sleeve-type suppressor (5 k Ω) 0 356 500 001.

- In order to prevent the trigger box from being irreparably damaged, the secondary side of the ignition system must have at least 2 k Ω interference suppression whereby the original distributor rotor with 1 k Ω interference-suppression resistor must be fitted (even in the case of radio and spark interference suppression do not use a 5 k Ω distributor rotor).
- No external voltage, for example ohmmeter, may be connected to the ignition-pulse generator (hall generator).

Caution when switching over measuring ranges.

- The lead from the ignition-pulse generator to the spark-advance unit and from spark-advance unit to trigger box must be shielded (disruption of spark-advance / trigger box functioning).
- The holding springs of the distributor cap must not drop into the pickup system when the engine is being cranked and with the dust-protection cover removed.
- Flashover or disruptive discharge at the ignition-distributor cap (poor insulation) can destroy the ignition-pulse generator and trigger box.
- Do not disconnect battery with engine running.
- Incorrect battery polarity will destroy ignition-pulse generator, trigger box, and ignition coil, as well as the spark-advance unit.
- Do not use a starting aid with more than 16 V or a fast charger for starting.



9. Trouble-shooting program

9.1 Procedure - trouble-shooting chart

The trouble-shooting chart starting on Coordinate B 3 contains customer complaint (fault symptoms), cause of trouble, test instructions and coordinate reference.

The possible cause of the fault should be selected from the trouble-shooting chart in accordance with the customer complaint (fault symptom).

If the cause of the fault is not clear, start testing with the detailed, self-contained trouble-shooting program beginning on Coordinate B 7.

If the cause of the fault is clear from the trouble-shooting chart, direct trouble-shooting is possible by going to the stated coordinate without having to perform the entire trouble-shooting program for each fault.

If there is no coordinate reference, trouble-shooting must be performed in accordance with the "Test instructions" column.

9.2 Procedure - trouble-shooting program

The trouble-shooting program starting on Coordinate B 9 is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The center row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and the explanations of the items in the picture.

If the questions asked in the left-hand row can be answered conclusively with "yes", then proceed to the next test down.

9.3 Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e. g. compression, valve clearance etc.). Ambient temperature/ignition system temperature 0° to 100° C (temperature has a considerable effect on measured values).

B1

Trouble-shooting chart

Alfa Romeo



B2

Trouble-shooting chart

Alfa Romeo



9.4 Trouble-shooting chart

Customer complaint (fault symptom)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

8. Backfiring

9. Engine becomes too hot

									Cause of trouble	Test instructions	Coordinates
●	●	●	●	●	●	●	●	●	Unclear	Perform detailed trouble-shooting	B 9
●	●	●	●	●	●		●		Spark plugs defective	Evaluation by means of ignition oscilloscope, or visual examination of removed spark plug	-----
●	●	●	●	●					Shunt on secondary side	Evaluation of ignition coil, ignition distributor, ignition harness and spark plug by means of ignition oscilloscope or visual examination	-----
●	●	●	●	●					Open circuit on secondary side	Evaluation of ignition coil, ignition distributor, ignition harness and spark plug by means of ignition oscilloscope, or continuity test with ohmmeter	-----
●									Open circuit on primary side	---	D 1
●	●	●	●	●					Ignition coil defective	---	B 11
		●	●	●	●				Interference-suppression resistors defective	Evaluation by means of ignition oscilloscope or resistance measurement	-----

B3

Trouble-shooting chart

Alfa Romeo



B4

Trouble-shooting chart

Alfa Romeo



Trouble-shooting chart

Customer complaint (symptom of trouble)

1. Starting motor operates but engine fails to start
2. Rough idling
3. Poor throttle response
4. Engine lacks power
5. Misfiring
6. Excessive fuel consumption
7. Engine pings when accelerating
8. Backfiring
9. Engine becomes too hot

										<u>Cause of trouble</u>	<u>Test instructions</u>	<u>Coordinates</u>
									•	Coolant-temperature switch defective	-	B 17
			•		•	•			•	Idle switch defective	-	B 19
			•		•	•				Full-load switch defective	-	B 21
•	•	•	•	•	•	•	•	•	•	Basic ignition-timing setting	To prevent incorrect adjustment, testing must be carried out per coordinate specifications	B 19 - C 1
				•						Trigger box defective	-	C 5

B5

Trouble-shooting chart

Alfa Romeo



B6

Trouble-shooting chart

Alfa Romeo



Rapid diagnosis chart

Customer complaint (symptom of trouble)

1. Starting motor operates, but engine fails to start										
2. Rough idling										
3. Poor throttle response										
4. Engine lacks power										
5. Misfiring										
6. Fuel consumption too high										
7. Engine pings when accelerating										
8. Backfiring										
9. Engine becomes too hot										
<u>Cause of trouble</u>										
<u>Test instructions</u>										
<u>Coordinates</u>										
●								Power supply for trigger box defective	-	D 1
●								Magnetic pulse generator defective	-	D 3 ... D 7
●								Spark advance mechanism defective	-	D 9
●							●	Ignition sequence incorrect	See Autodata test specifications	----

B7

Trouble-shooting chart

Alfa Romeo



B8

Trouble-shooting chart

Alfa Romeo



9.5 Trouble-shooting program

Test primary signal. If no oscilloscope or tachometer available, check whether ignition spark across spark gap.

Primary signal testing with oscilloscope
Connect oscilloscope to ignition coil as per operating instructions.
Start engine.
Oscilloscope must indicate a primary voltage (of any value).

Primary signal testing with tachometer
Connect tachometer to ignition coil as per operating instructions.
Start engine.
Tachometer must indicate a reading (of any value).

Ignition spark testing with spark gap
Remove H.T. igniton cable terminal 4 from ignition coil.
Connect spark gap including sleeve-type suppressor (5 k Ω) to ignition coil.
Adjust spark gap to 5 mm.
Start engine.
There must be sparks across the spark gap.

Primary signal present or ignition sparks across spark gap?

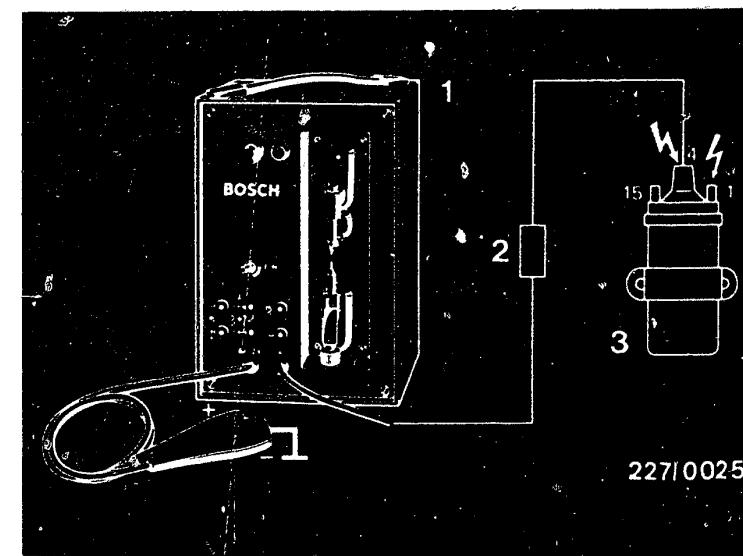
yes

Continued on B 11/B 12

no

If no primary signal or no ignition spark, continue testing at D 1.

Tests from B 11 onwards not necessary.



- 1 = Spark gap
- 2 = 5 k Ω sleeve-type suppressor
- 3 = ignition coil

Dangerous-voltage arrows:
Caution, 400 V ... 25 kV

B9

Trouble-shooting program

Alfa Romeo

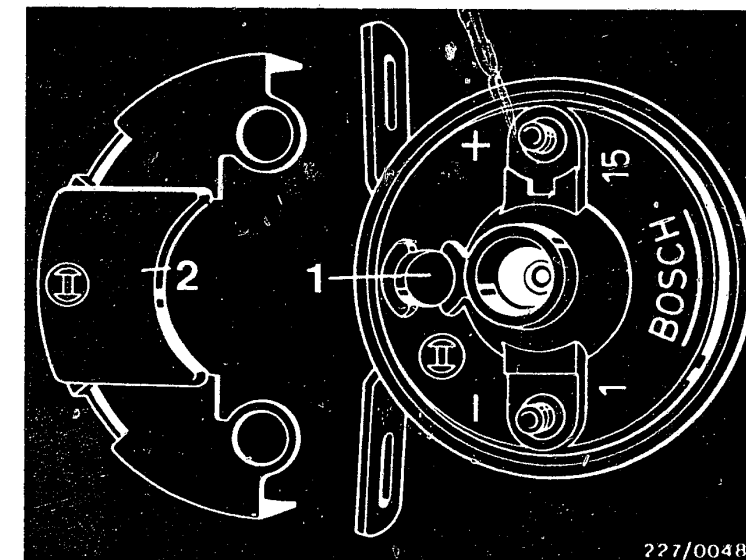
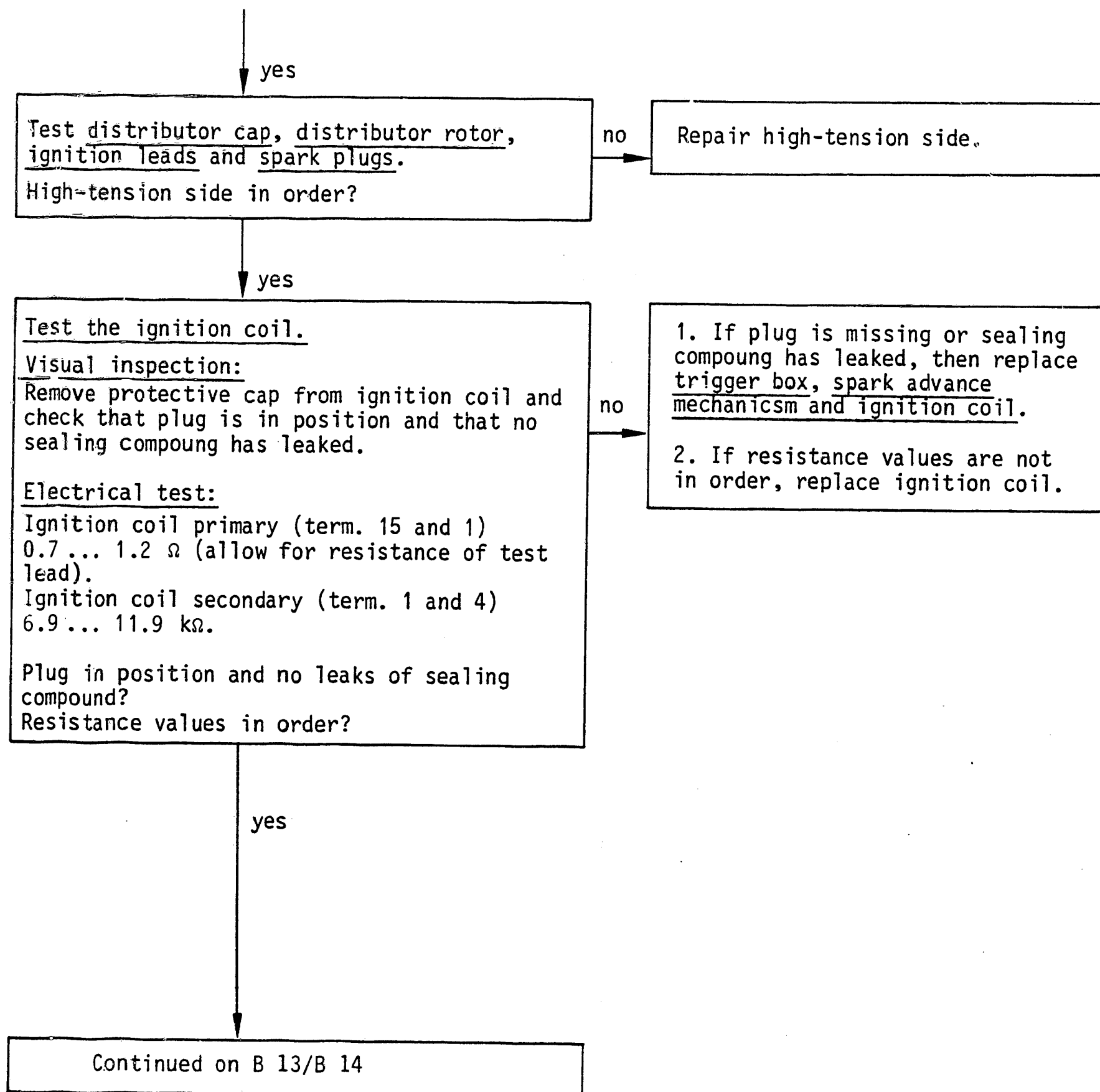


B10

Trouble-shooting program

Alfa Romeo





1 = Plug
2 = Protective cap

B11

Trouble-shooting program

Alfa Romeo

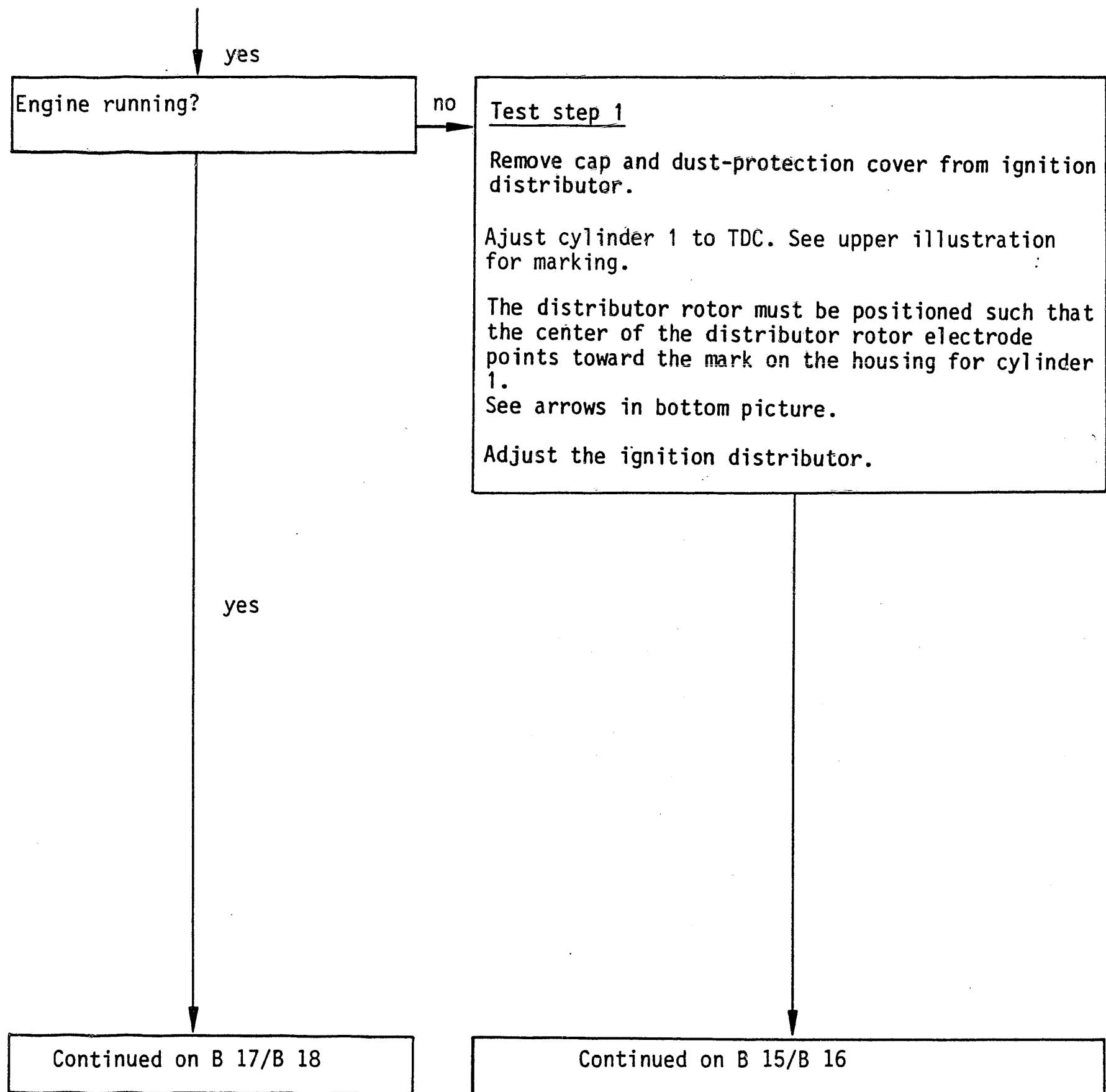


B12

Trouble-shooting program

Alfa Romeo





P = TDC



B13

Trouble-shooting program
Alfa Romeo



B14

Trouble-shooting program
Alfa Romeo



Continued

Test step 2

Disconnect negative and positive lead from battery. Remove trigger-box plug. Switch on ignition.

1. Test for contact resistance in cable from positive battery terminal to trigger box term. 4 including cables from negative battery terminal to trigger box plug term. 2. Total contact resistance max. 0.3Ω (make allowance for resistance of test lead).

Eliminate contact resistance.

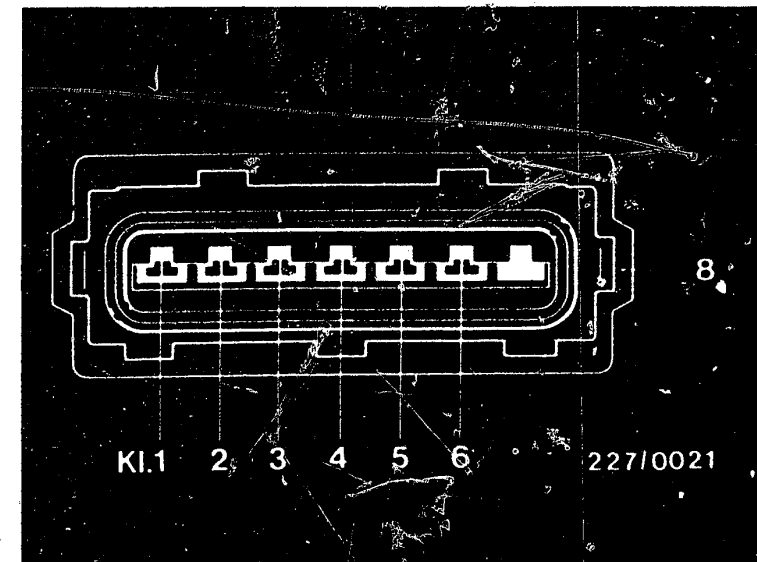
2. Test for contact resistance in cables from positive battery terminal to ignition coil term. 15 and in cable from ignition coil term. 1 to trigger box plug term. 1. Total contact resistance max. 0.3Ω (make allowance for resistance of test lead).

Eliminate contact resistance.

If test steps 1 and 2 are in order, replace trigger box.

yes

Continued on B17/B18



8 = Trigger box plug

B 15

Trouble-shooting program

Alfa Romeo



B 16

Trouble-shooting program

Alfa Romeo



yes

Test coolant-temperature switch.

Switch off ignition.

Remove spark-advance unit plug and connect voltmeter to 3 (+) and term. 7 (-). See illustration.

Switch on ignition.

Voltmeter shows:

approx. battery voltage at < approx. + 35°C
0 V at > approx. +41°C.

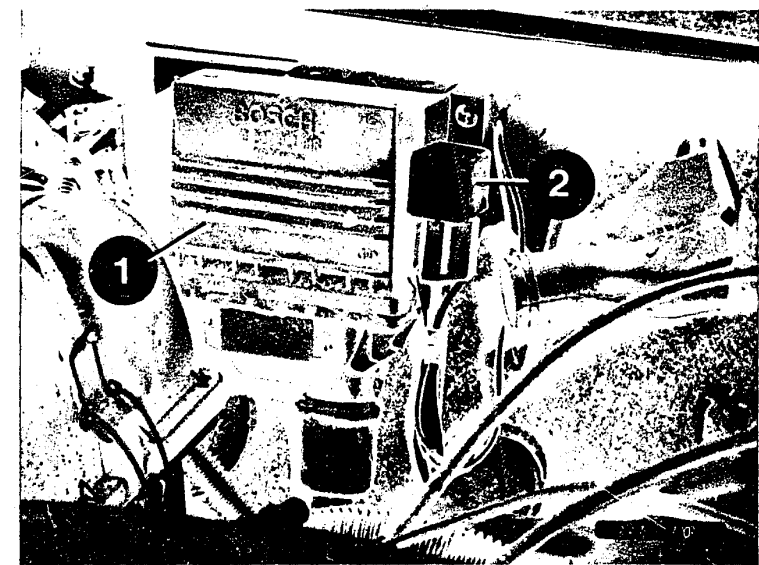
Voltage value OK?

no

Check lead from spark-advance unit plug term. 7 to coolant-temperature switch for open circuits. Eliminate open circuit. If no open circuit was present, check operation of coolant-temperature switch.

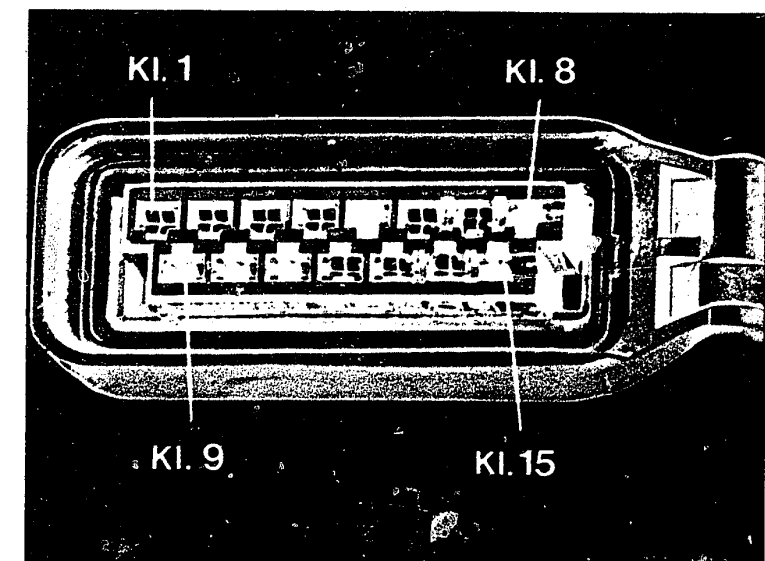
yes

Continued on B19/B20



1 = Spark-advance unit
2 = Characteristic-curve actuation relay

Spark-advance unit plug



B17

Trouble-shooting program

Alfa Romeo

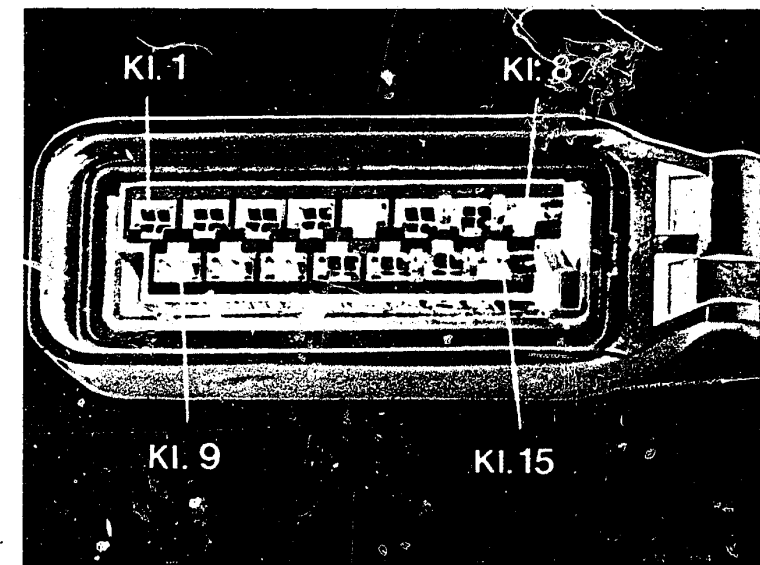
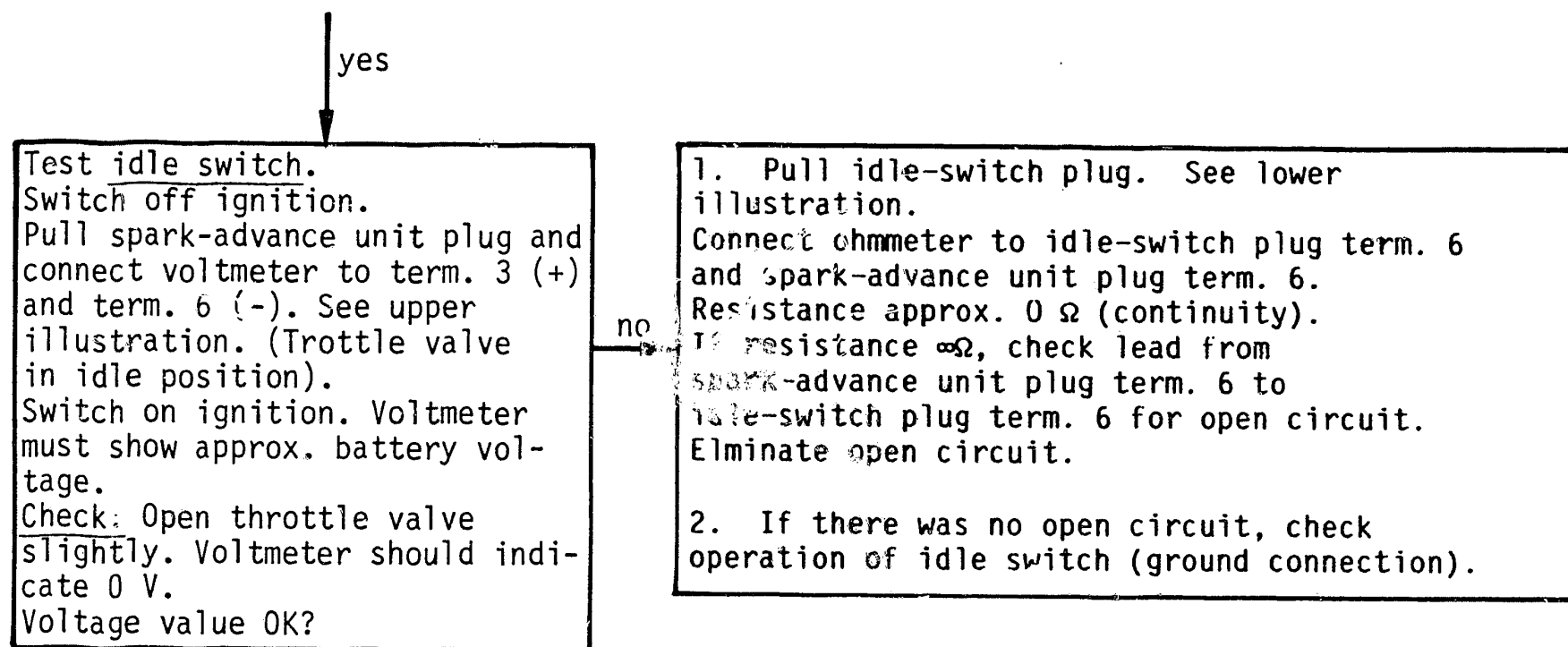


B18

Trouble-shooting program

Alfa Romeo





Spark-advance unit plug

1 = Idle switch
2 = Idle-switch plug



Continued on B21/B22

B 19

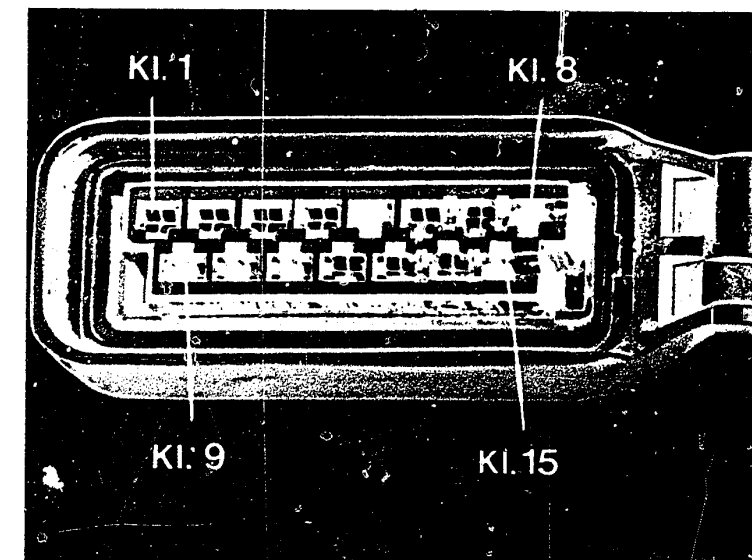
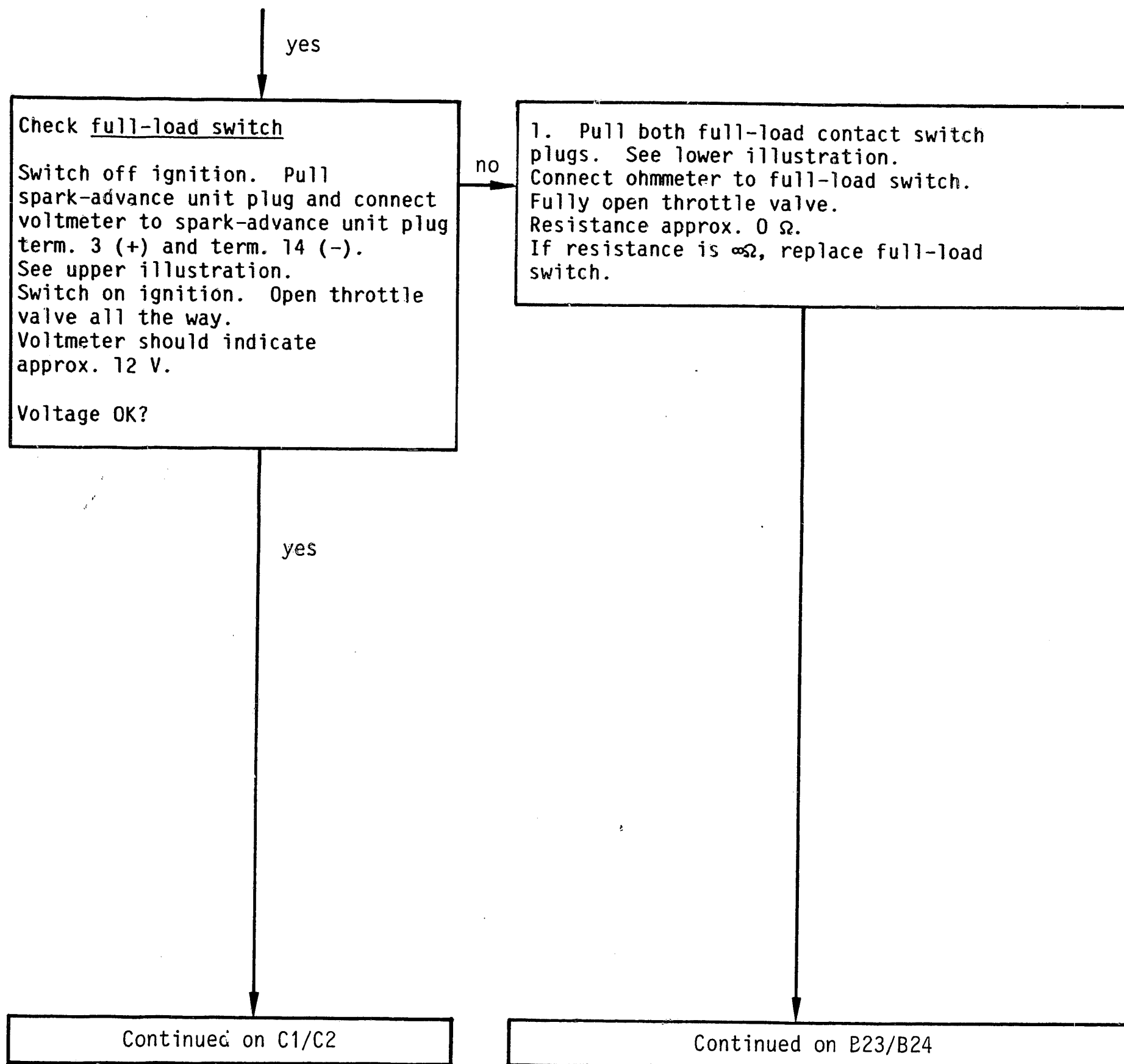
Trouble-shooting program
Alfa Romeo



B 20

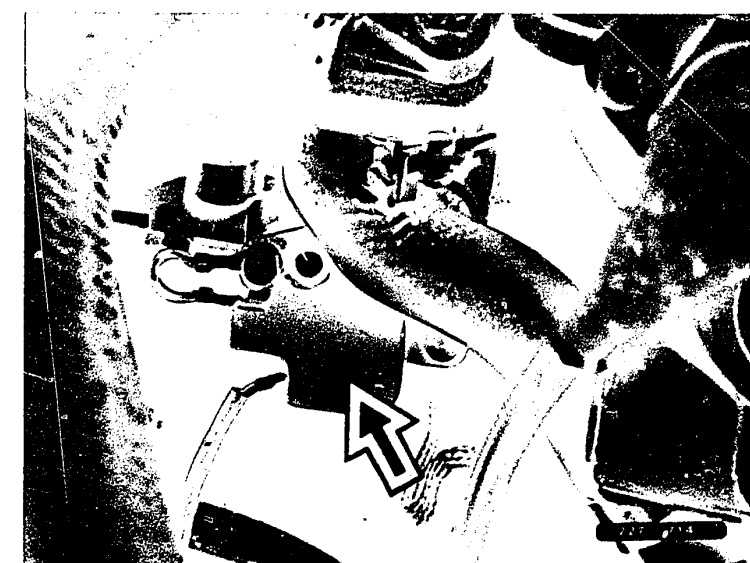
Trouble-shooting program
Alfa Romeo





Spark-advance unit plug

Arrow = Full-load switch



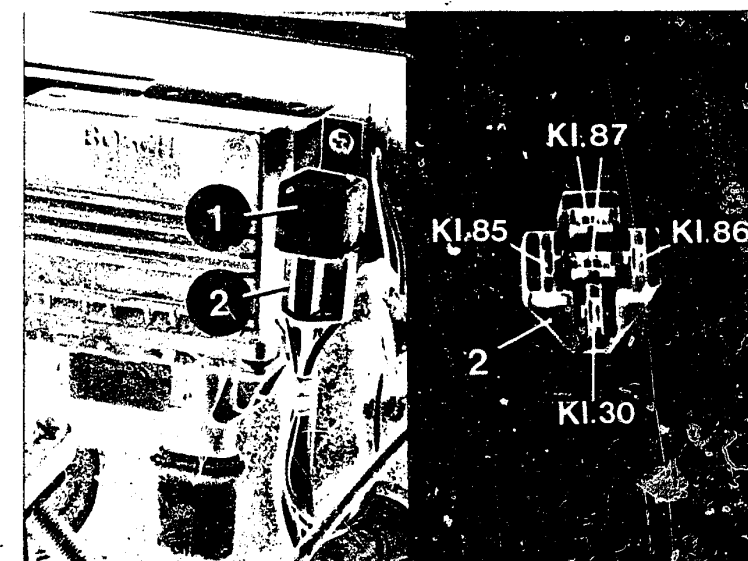
Continued

2. If point 1 was OK, check ground lead from full-load switch or leads from the characteristic-curve actuation relay term. 30, 85, 86, and 87 for open circuits.

Eliminate open circuit, replace defective relay.

yes

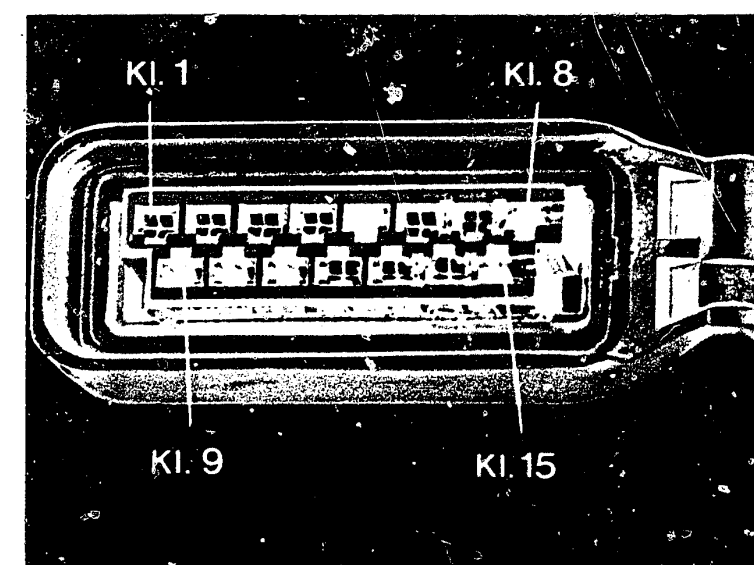
Continued on C1/C2



1 = Characteristic-curve actuation relay

2 = Plug

Spark-advance unit plug



B23

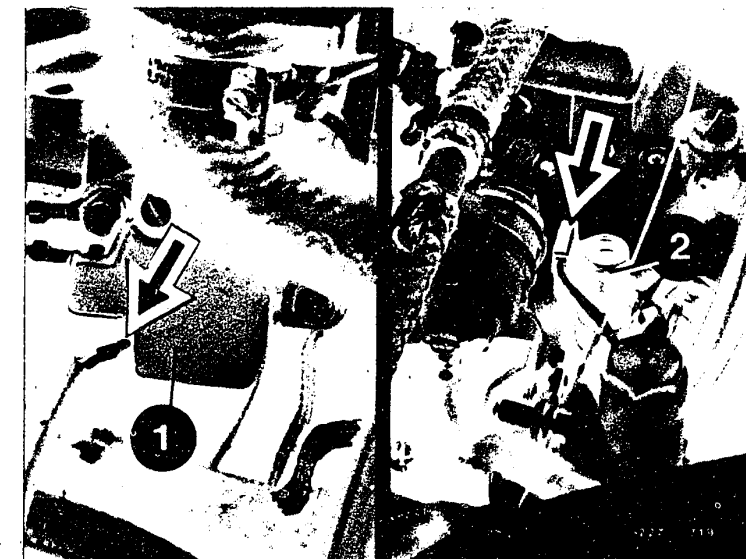
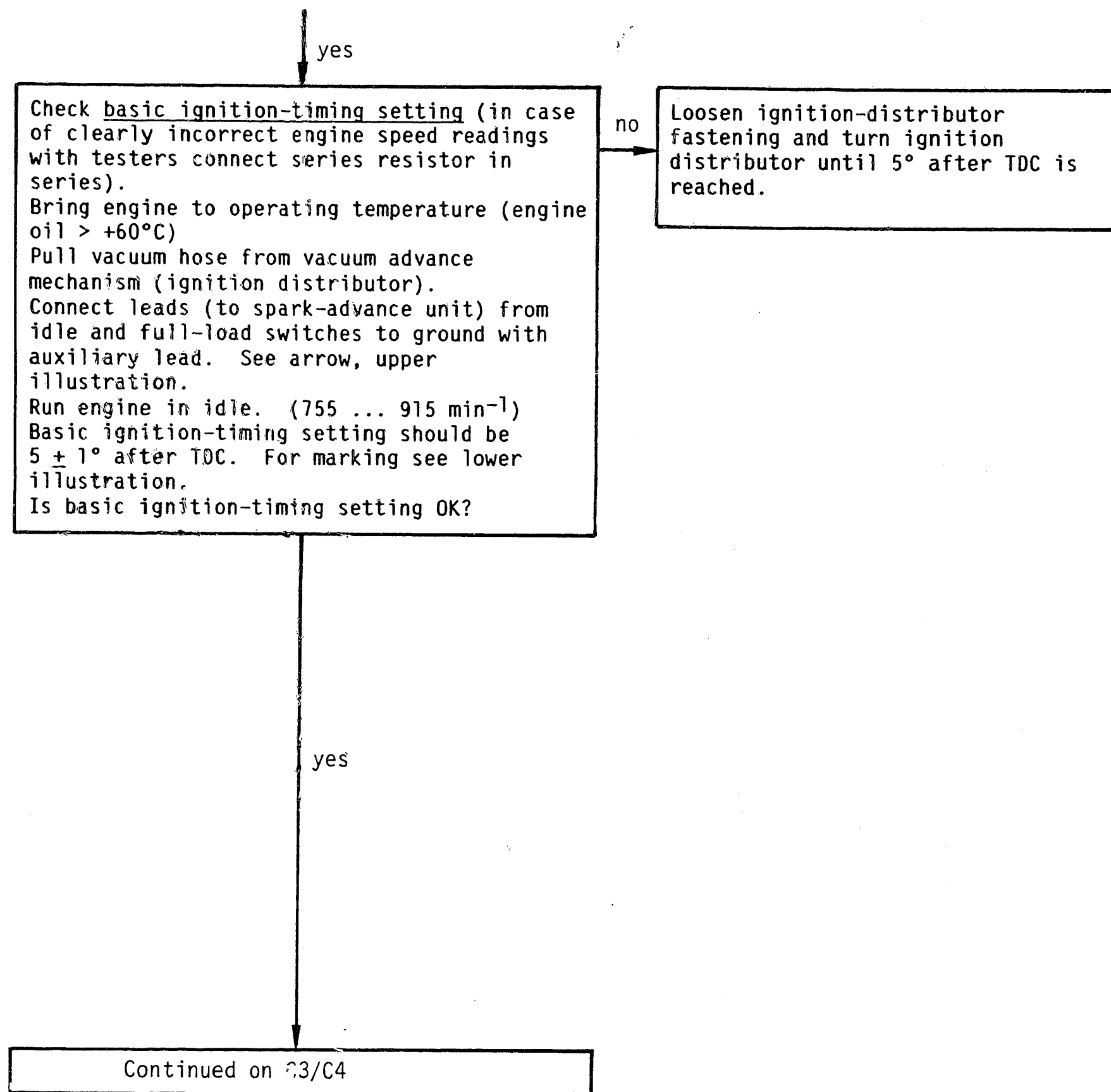
Trouble-shooting program
Alfa Romeo



B24

Trouble-shooting program
Alfa Romeo





1 = Full-load switch
 2 = Idle switch

F = Ignition-timing setting marking
 5° after TDC



C1

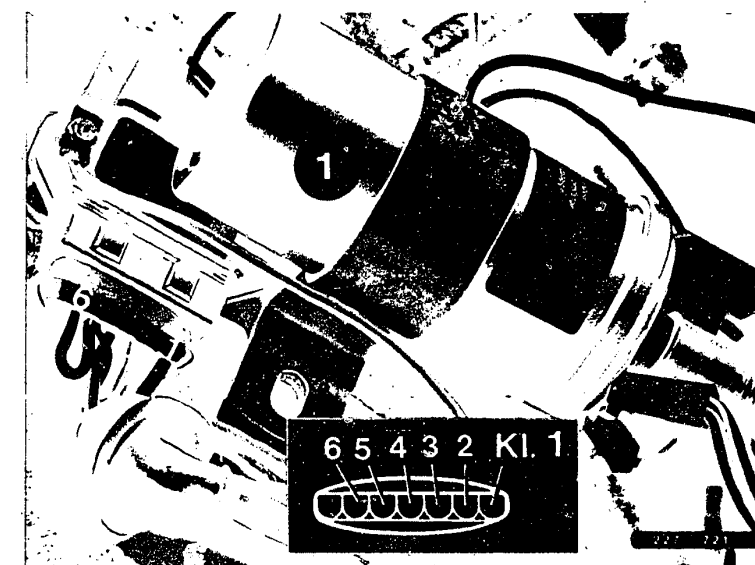
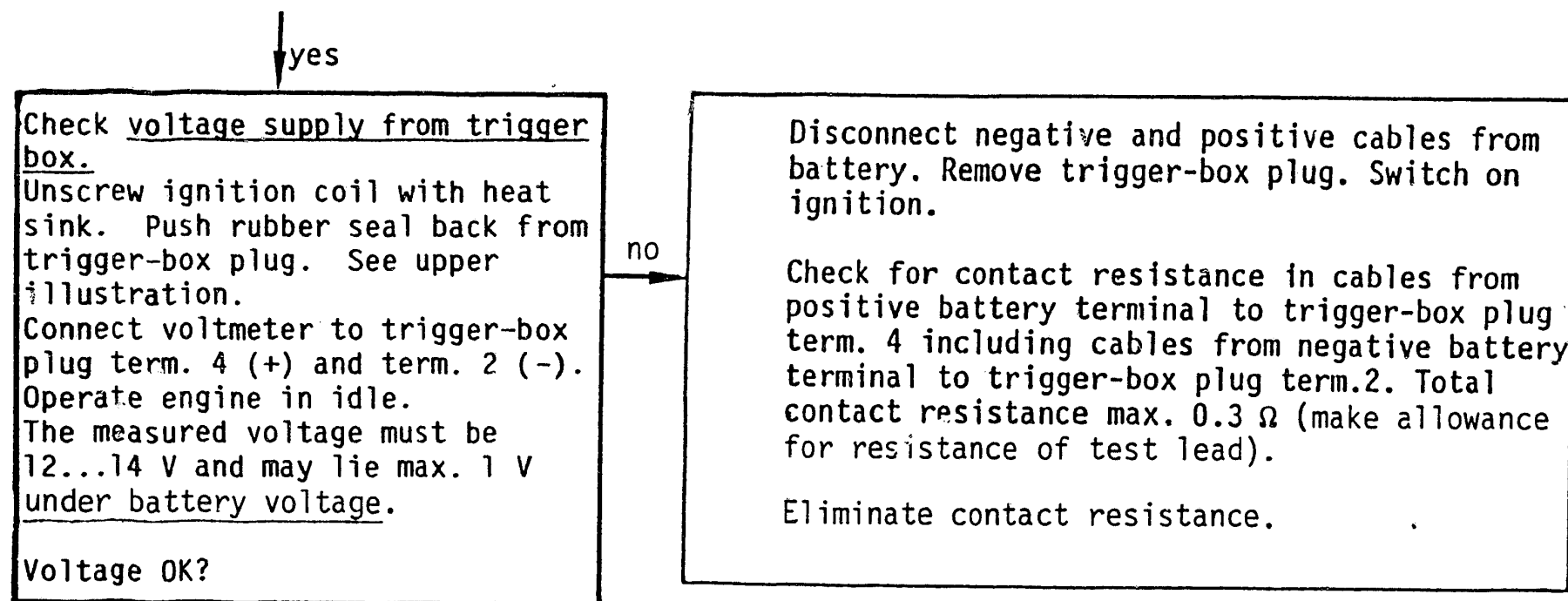
Trouble-shooting program
 Alfa Romeo



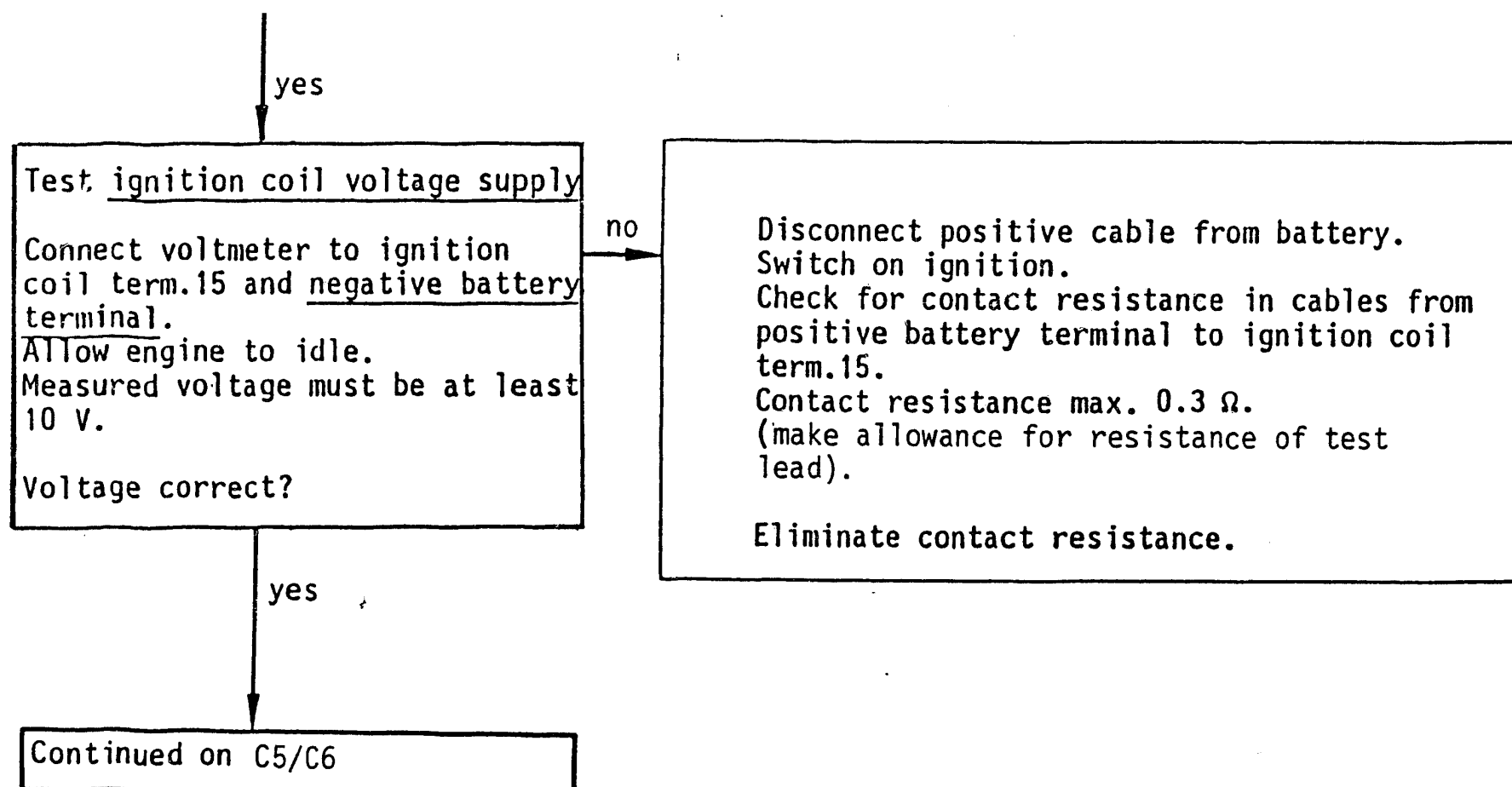
C2

Trouble-shooting program
 Alfa Romeo

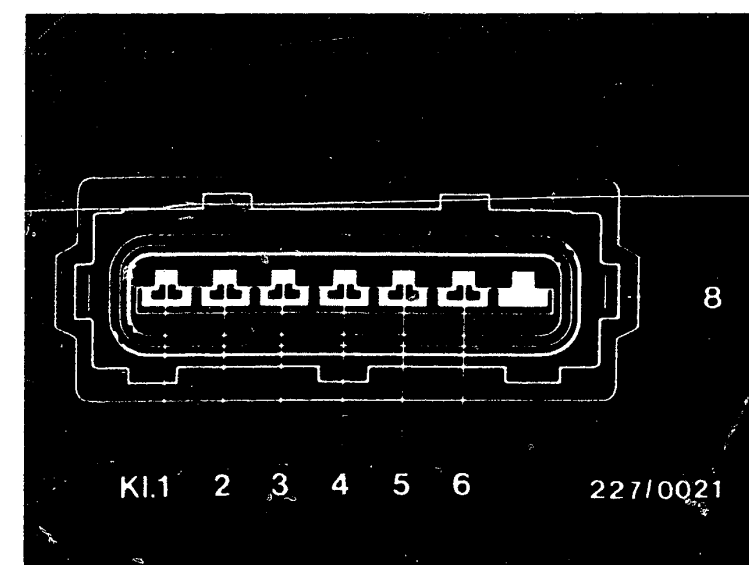




1 = Ignition coil with cooling plate



8 = Trigger-box plug



C3

Trouble-shooting program
 Alfa Romeo



C4

Trouble-shooting program
 Alfa Romeo



yes

Check primary voltage.
(Where MOT series available).

Connect oscilloscope (e.g. MOT 201) together with pulse-shaping circuit 1 684 463 154 to ignition coil per operating instructions.

Note:
Incorrect reading will be obtained in absence of pulse-shaping circuit.

Run engine in idle. The measured primary voltage should be 295 ... 365 V. See illustration.

Voltage OK?

no

Replace trigger box.

yes

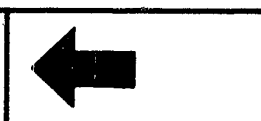
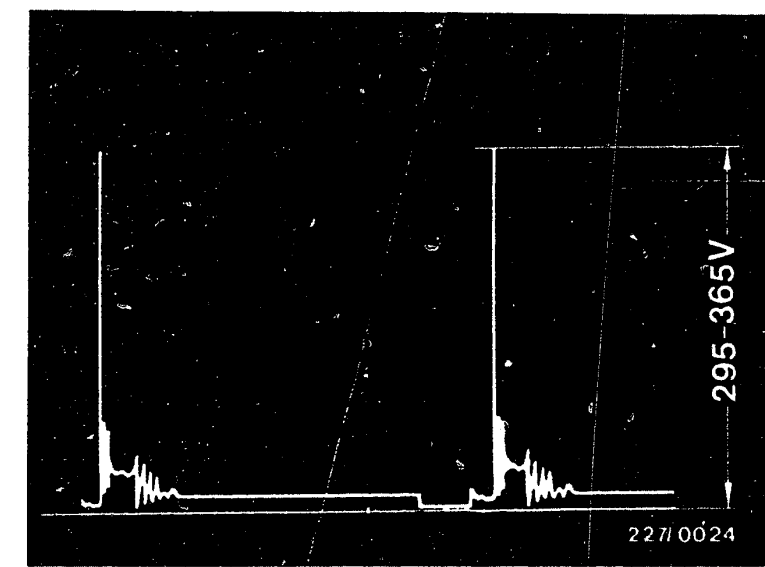
Ignition system O.K.

Test completed

Tests starting at D 1 no longer necessary.

Note:

If customer complaint is not yet remedied, then check for further possible faults in the fuel system, or engine not mechanically O.K.



No primary signal or ignition spark.

(Continued from B9/B10)

yes

Check voltage supply from trigger box.
Pull trigger-box plug.
Connect voltmeter to trigger-box plug term. 4 (+) and term. 2 (-).
Switch on ignition. Voltmeter should indicate battery voltage.

no

Test cables and connections between ignition/starter switch and trigger box plug term. 4 for open circuit, including ground cable term. 2. Eliminate open circuit.

yes

Test primary circuit.

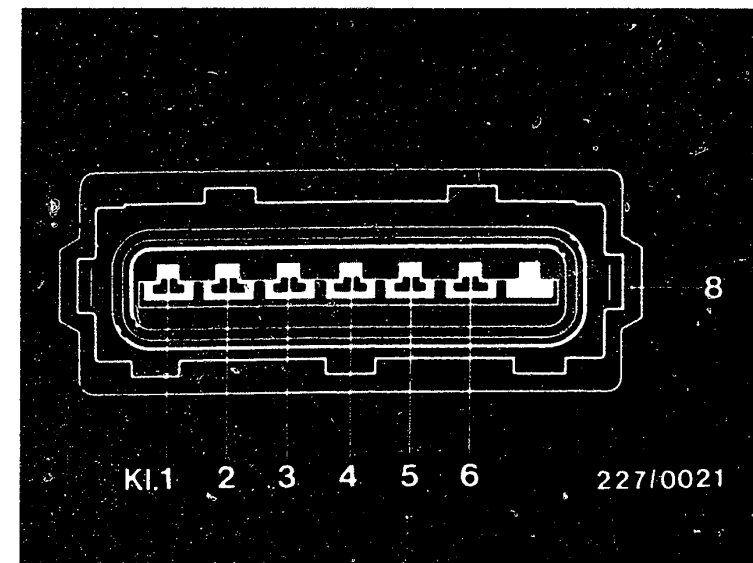
Connect voltmeter to pulled trigger-box plug term. 1 (+) and term. 2 (-).
Switch on ignition.
Voltmeter must indicate battery voltage.
Voltage value in order?

no

Test supply cable from ignition/starter switch to ignition coil term. 15, primary winding of ignition coil and cable from ignition coil term. 1 to trigger box plug term. 1 for open circuit, including ground cable term. 2. Eliminate open circuit.

yes

Continued on D3/D4



8 = Trigger box plug

D1

Trouble-shooting program
Alfa Romeo



D2

Trouble-shooting program
Alfa Romeo



yes

Check ignition-distributor plug and socket.

Press wire fuse from ignition-distributor plug. See arrow in upper illustration.

Pull ignition-distributor plug.

Visual check:

Check ignition-distributor plug and socket contacts for oxidation.

Remove oxidation.

Reinsert ignition-distributor plug.

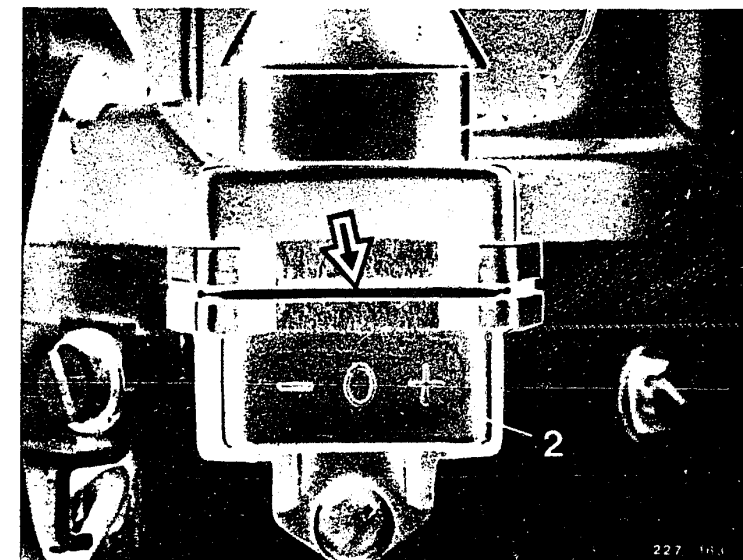
Trigger-box plug is connected.

Start engine.

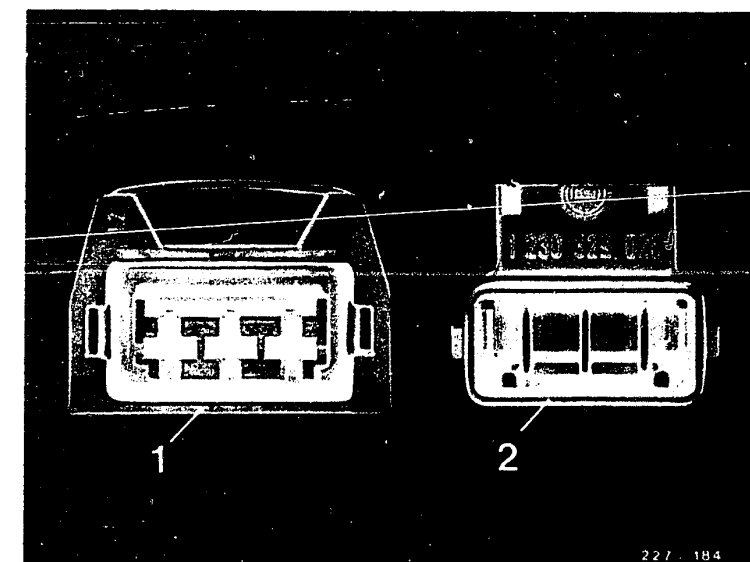
If there is still no primary signal or ignition spark, continue testing.

yes

Continued on D5/D6



1 = Ignition-distributor plug
2 = Ignition-distributor plug socket



D3

Trouble-shooting program

Alfa Romeo



D4

Trouble-shooting program

Alfa Romeo



yes

Test pulse generator voltage supply.

Trigger-box plug is connected.
Push rubber sleeve back from ignition-distributor plug.

Connect voltmeter to ignition-distributor plug term. 4 (+) and term. 2 (-).

Switch on ignition.

Voltmeter must indicate a voltage of > 10V.

Voltage correct?

no

Disconnect trigger-box plug, ignition distributor plug and timing-advance unit plug.

Connect to ohmmeter one after the other.

1. <u>Ignition-distributor plug</u>	<u>Spark advance mechanism plug</u>
-------------------------------------	-------------------------------------

Term. 4	and term. 4
Term. 2	and term. 2

In each case ohmmeter must indicate approx. 0 Ω (continuity). Eliminate open circuit.

2. <u>Spark advance mechanism plug</u>	<u>Trigger-box plug</u>
--	-------------------------

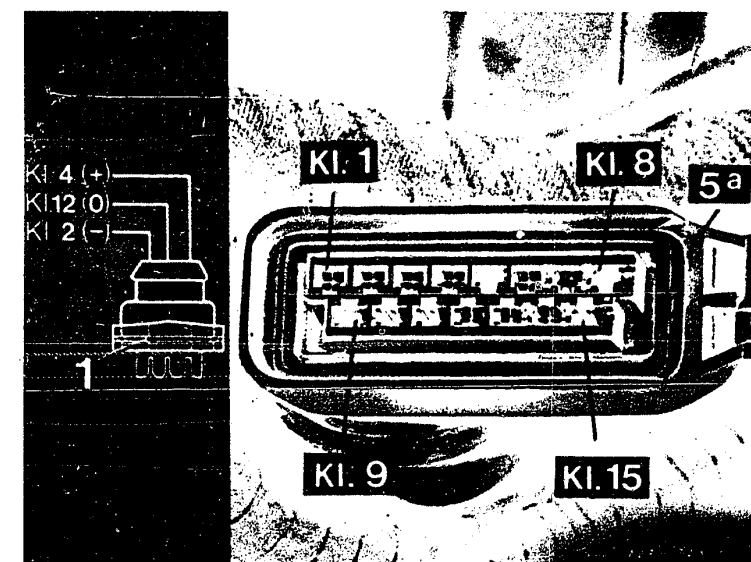
Term. 1	and	term. 3
Term. 3	and	term. 4

In each case ohmmeter must indicate approx. 0 Ω (continuity). Eliminate open circuit.

If there was no open circuit in Points 1 and 2, replace ignition timing unit.

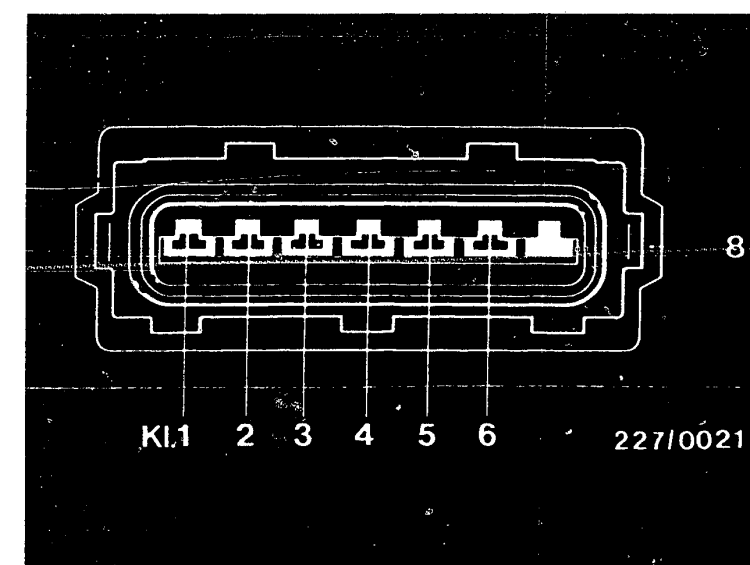
yes

Continued on D7/D8



1 = Ignition distributor plug
5a = Spark advance mechanism plug

8 = Trigger-box plug



D5

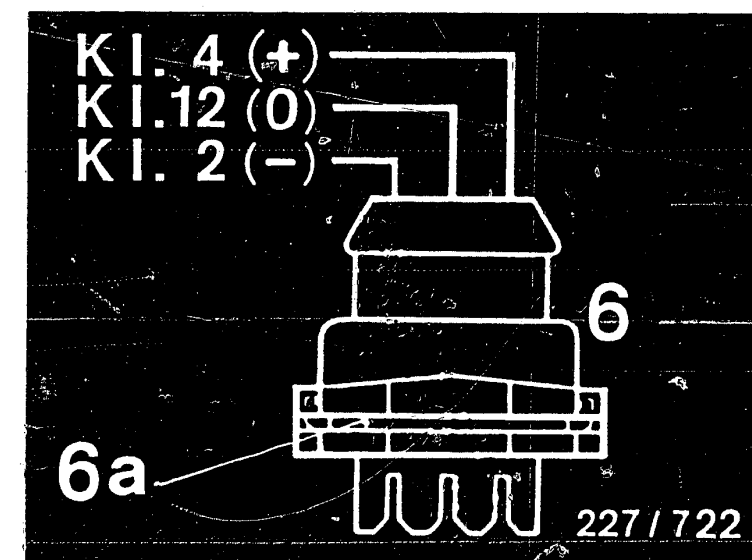
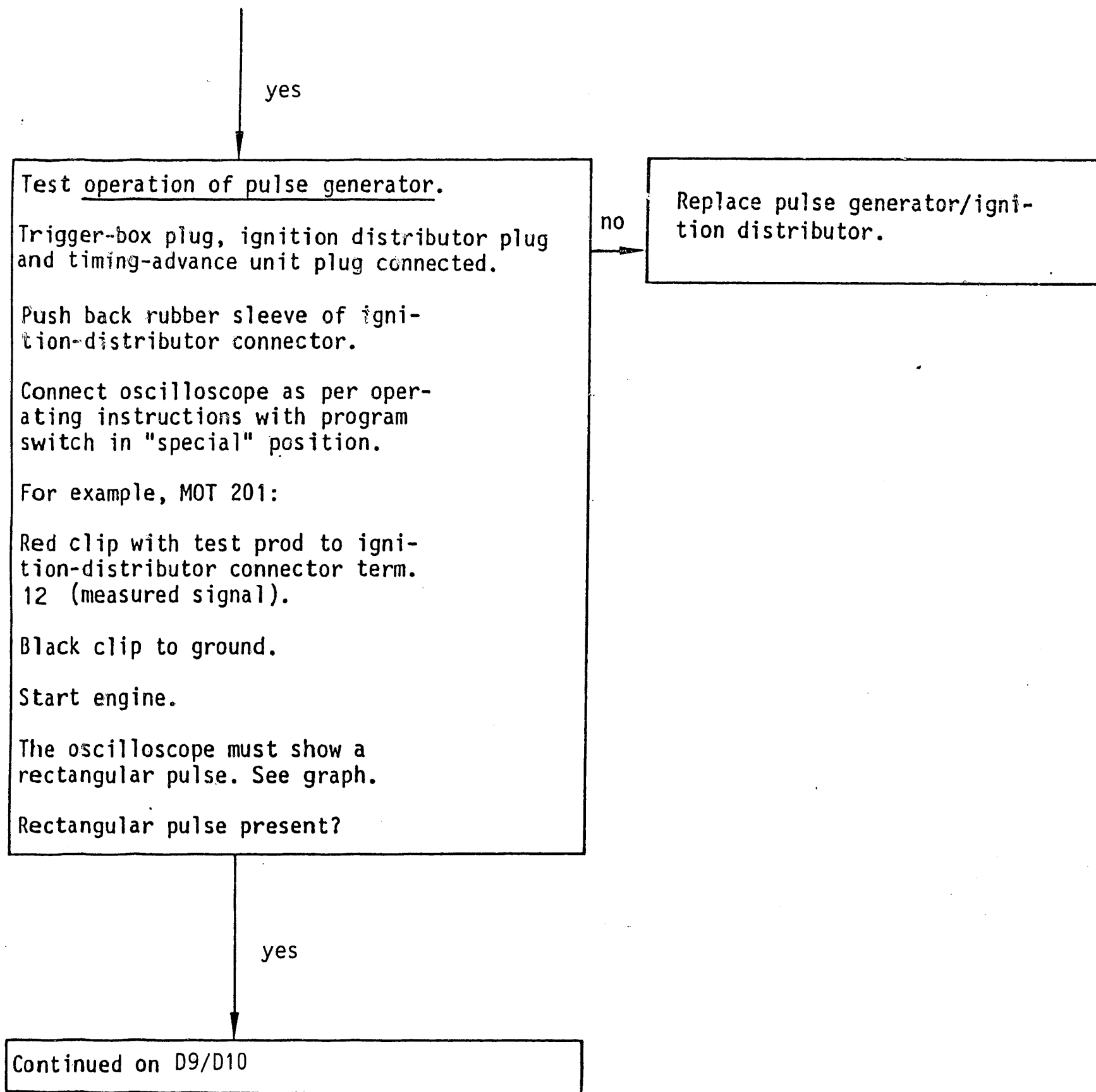
Trouble-shooting program
Alfa Romeo



D6

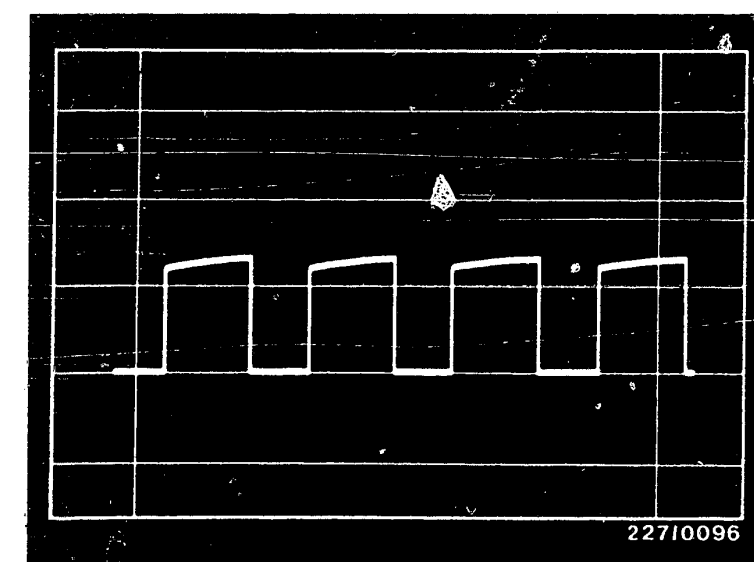
Trouble-shooting program
Alfa Romeo





6 = Ignition-distributor plug
6a = Wire-strap fuse

Rectangular pulse



D7

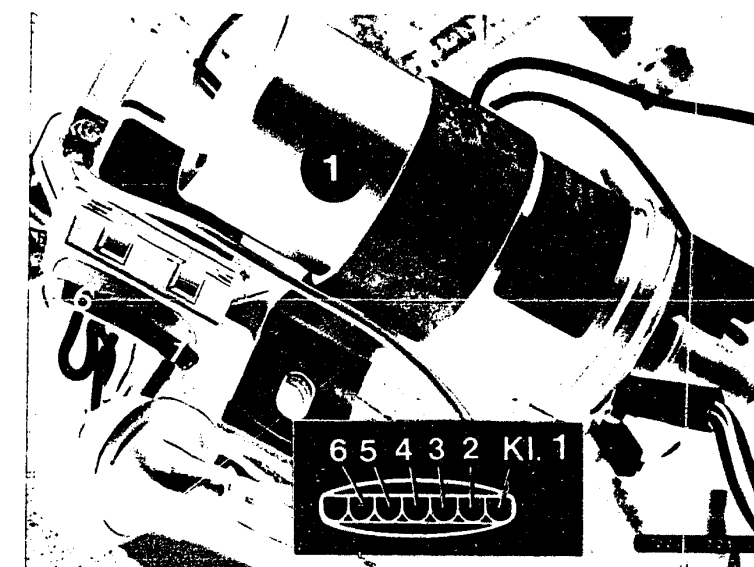
Trouble-shooting program
Alfa Romeo



D8

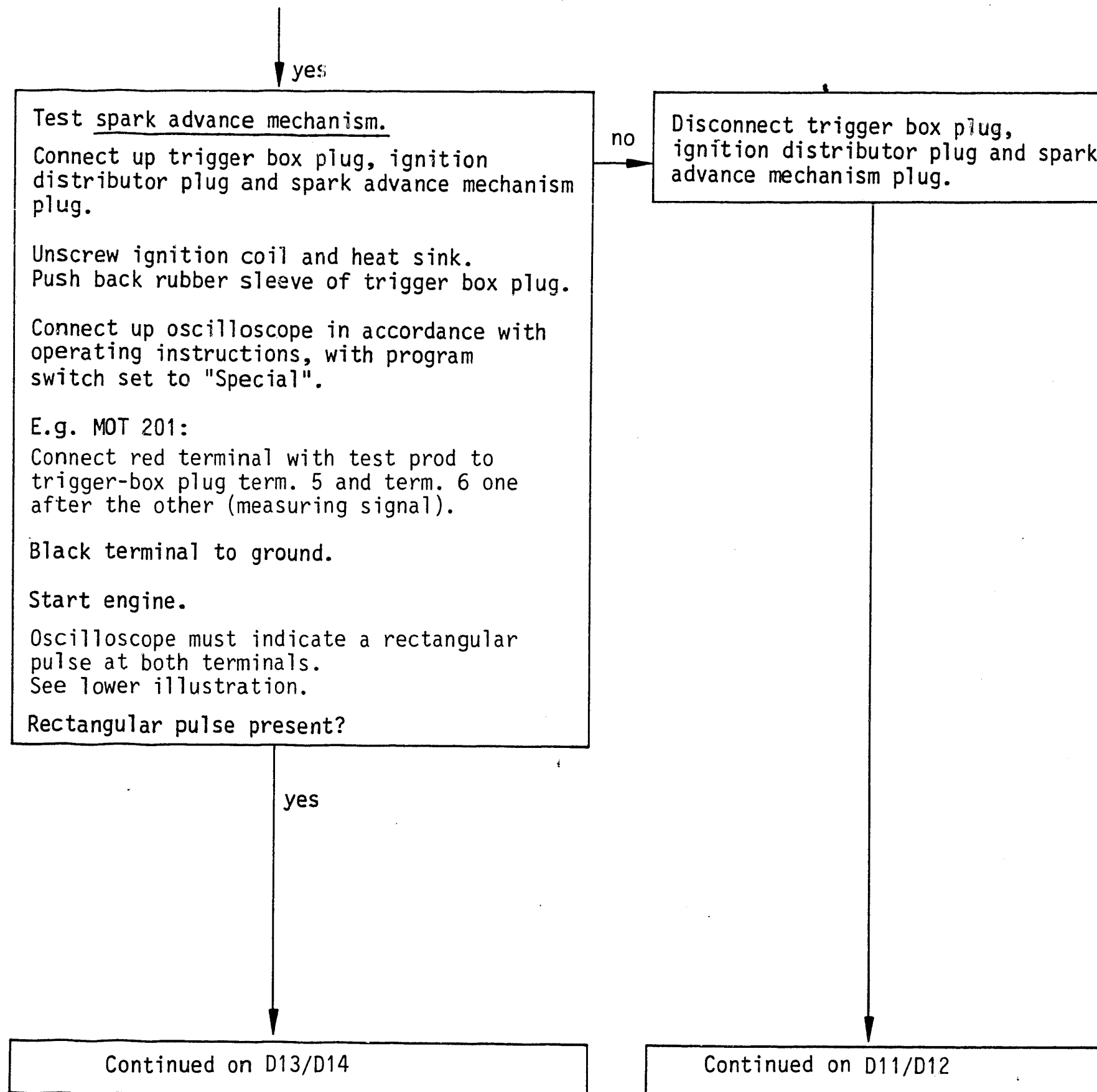
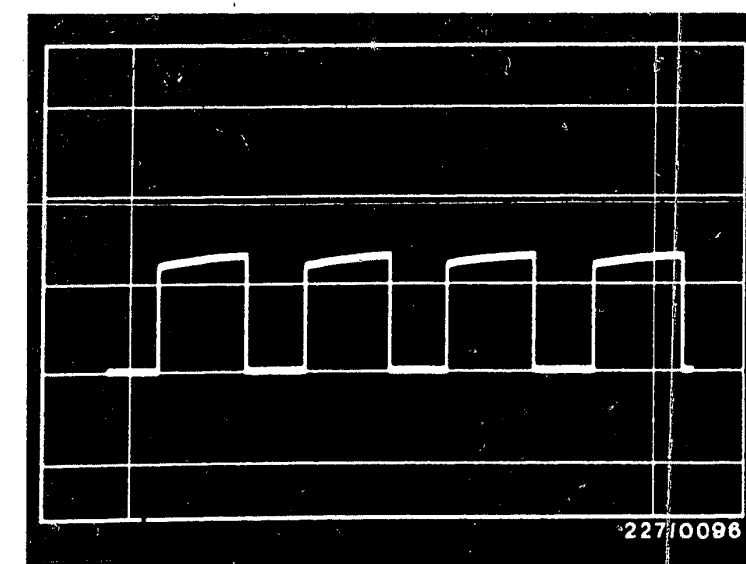
Trouble-shooting program
Alfa Romeo





1 = Ignition coil and heat sink

Rectangular pulse



D9

Trouble-shooting program
 Alfa Romeo



D10

Trouble-shooting program
 Alfa Romeo



Continued

Connect ohmmeter to each of the following in succession:

Ignition distributor plug

Spark advance
mechanism plug

Term. 12

and

Term. 12

Spark advance mechanism
plug

Trigger box plug

Term. 13

and

Term. 5

Term. 13

and

Term. 6

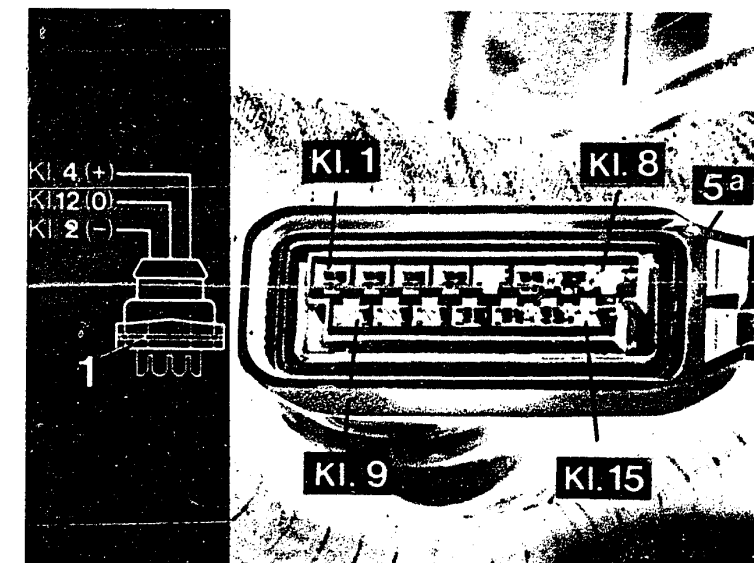
Ohmmeter must indicate approx. 0 Ω (continuity)
in each case.

Eliminate any open circuit.

If no open circuit has been detected, replace
spark advance mechanism.

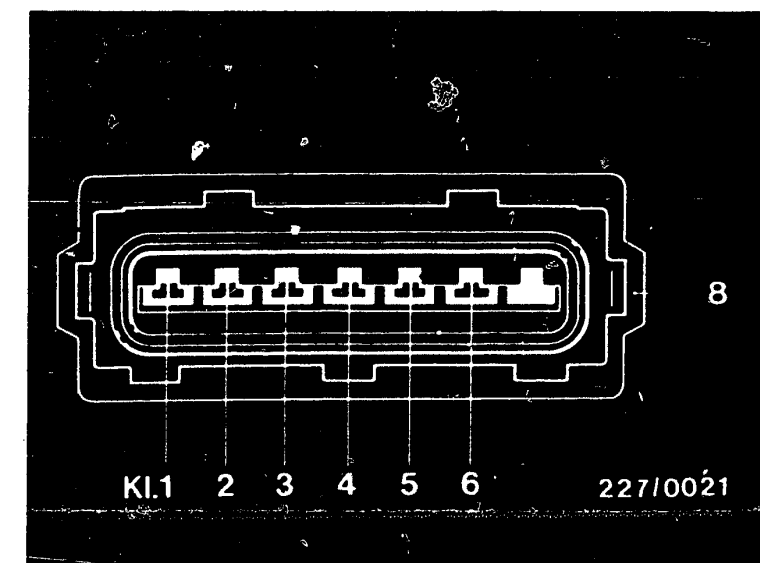
yes

Continued on D13/D14



1 = Ignition distributor plug
5a = Spark advance mechanism plug
KI.= Term.

8 = Trigger box plug



D11

Trouble-shooting program
Alfa Romeo



D12

Trouble-shooting program
Alfa Romeo



yes

Test ignition coil.

Visual examination:

Remove protective cap from ignition coil and check whether plug (see picture) is in position and whether any sealing compound has escaped.

Electrical test:

Ignition coil primary (term. 15 and term. 1) $0.7 \dots 1.2 \Omega$
(make allowance for resistance of test lead).

Ignition coil secondary (term. 1 and term. 4) $6.9 \dots 11.9 \text{ k}\Omega$.

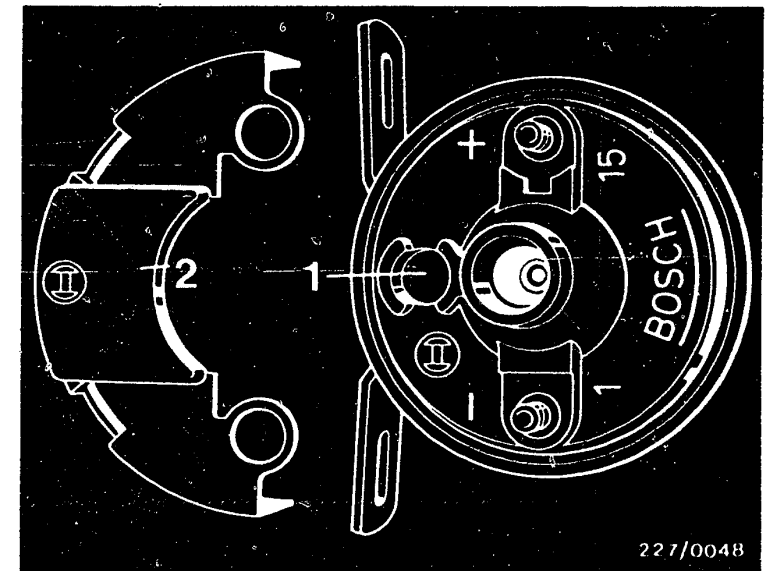
Plug in position? No sealing compound escaped?

Resistance value O.K.?

no

1. If plug is not in position and/or sealing compound has escaped, replace trigger-box, ignition timing unit and ignition coil.

2. If resistance values are not O.K., replace ignition coil.



1 = Plug
2 = Protective cap

yes

Replace trigger box.

Test completed.

Tests from B11 not necessary.

Note:

If customer complaint is not yet remedied, then check for further possible faults in the fuel system, or engine not mechanically O. K.

D13

Trouble-shooting program

Alfa Romeo



D14

Trouble-shooting program

Alfa Romeo



After-sales Service

Technical Bulletin

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22

Danger of Accident on Semi-conductor Ignition Systems

VDT-I-227/102 B

11.1976

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

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N1

Technical Bulletin

Alfa Romeo

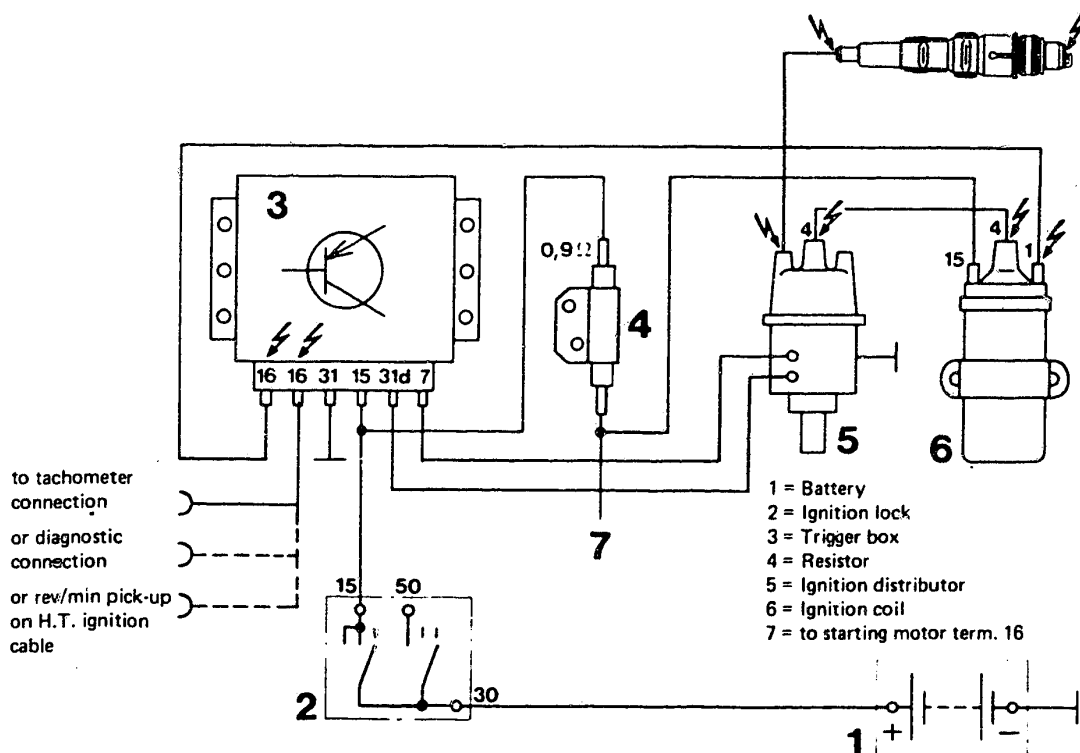


In addition, in the case of the capacitor-discharge ignition system (CDi), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram



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EFFECTS OF ELECTRICAL AND ELECTRONIC
SYSTEMS ON HEART PACEMAKERS

VDT-I-227/107 En

1.1981

e.g. ignition systems, Jetronic, Motronic, ABS

Please ensure without fail that this Bulletin is passed on to your employees for their attention!

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinischen Technik" (5/80) listed the results.

The most important discoveries in this practice can be summarized from the examination report as follows:-

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.
2. With a stationary engine and the ignition switched off the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.
3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency).
Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.
4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers please carry out the necessary measures.

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We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

4 If you should receive questions on this matter from customers, please inform them accordingly.



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BREAKERLESS TRANSISTORIZED IGNITION SYSTEM

22

Warranty note

VDT-I-227/103 En
3.1979

Hybrid construction trigger boxes
0 227 100 100 for ignition distributor
with Hall generator (TCI-h)
0 227 100 102 for ignition distributor
with induction-type
pulse generator (TCI-i)

Apart from the well-known TCI trigger boxes 0 227 100 0.., trigger boxes of hybrid construction have been fitted as standard since 9.78 (Fig. 1).

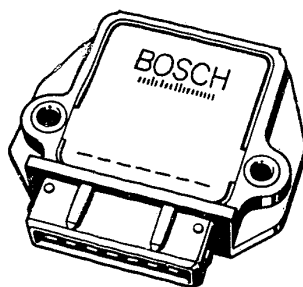


Fig. 1

Warranty procedure

If the complaints are justified, all these hybrid trigger boxes are to be sent, along with completed warranty documents, to your authorized representative for forwarding to the following address:

ROBERT BOSCH GMBH
KH/LAV - Auspackraum

zur Weiterleitung an K1/VAK 21

D-7000 Stuttgart 30

This instruction remains valid until further notice.

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NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En

1.1983

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Coil ignition	SZ (C*)	-----	Mechanical (breaker points)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized coil ignition	TSZ-K (TCI-c)	K=breaker-triggered	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Trigger box with conventional circuit techniques	TSZ-I* (TCI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
	TSZ-H	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
Transistorized ignition	TZ-I* (TI-i)	I=Induction-type pulse generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)
(Trigger box in Hybrid technique)	TZ-H* (TI-h)	H=Hall generator	Electronic (trigger box)	Mechanical (ignition distributor)	Mechanical (ignition distributor)

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Technical Bulletin

Alfa Romeo



Designation	Abbrev'd code	Meaning	Switching	Ignition control and spark advance	High-voltage distribution
Breakerless semiconductor ignition with or without knock control	EZ EZ-K	- K=Knock control	Electronic (trigger box or control unit)	Electronic (control unit)	Mechanical (ignition distributor or high-voltage distributor)
Distributorless ignition with or without knock control	VZ VZ-K	- K=Knock control	Electronic (control unit)	Electronic (control unit)	Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug)

*Note: The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).



After-sales Service

Motor Vehicle Service Information

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INCORRECT DISPLAY OF ROTATIONAL SPEED AND
DWELL ANGLE ONLY WITH TRIGGER BOXES
0 227 100 ... (TCI-i, TCI-h) WITH CURRENT
LIMITATION

VDT-I-Gen. 030 En
6.80
Supersedes Ed. 3.80

For additional information see VDT-I-Gen. 032 En

1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT 001.00}	Rotational-speed	KTE 001.00
001.01}	display O.K. with these	001.02
001.02	testers	001.03
001.04		
002.00		

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild- ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan-Datsun	(Hitachi ignition system)
Fiat	(Delco ignition system)	Peugeot	(Bosch ignition system)
Ford	(Delco ignition system)	VW	(Bosch/Fairchild ignition system)
General- Motors	(HEI-ignition system)	Bosch transistorized ignition system for retrofitting 0 227 100 920	

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Motor Vehicle Service Information

Alfa Romeo



2. Test instructions

2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min⁻¹ to 1200 min⁻¹).

It is, however, possible to attain correct rot.-speed measurements as follows:

Connect a ballast resistor of 0.9 or 1.0 Ohm (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

Suggestion for user manufacture

Required parts:

1 ballast resistor 0.9 Ohm

Part No. 0 227 900 002

or

1 ballast resistor 1.0 Ohm

Part No. 0 227 900 101

2 blade receptacles e.g.

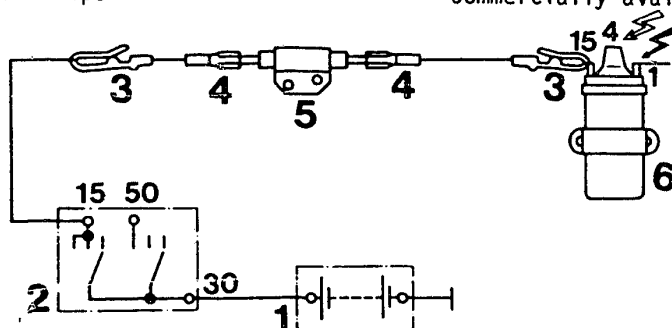
Part No. 1 901 355 881

approx. 0.2 m cable, 1.5 mm² e.g.

Part No. 6 210 150 150

2 insulated clips

Commercially available



1 = Battery

4 = Blade receptacle

⚡ approx. 400 V

2 = Ignition switch

5 = Ballast resistor

⚡ approx. 25 kV

3 = Clips

6 = Ignition coil

2.2 Dwell angle

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

2.3 Ignition point

Is displayed correctly. Connect tester as per operating instructions.



After-sales Service

Motor Vehicle Service Information

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MOTORTESTER CONVERSION

Incorrect display of rotational speed,
dwell angle and ignition point
only with trigger boxes
0 227 100 ... (TCI-i, TCI-h) with current
limitation

VDT-I-Gen. 032 En
6.80

For additional information see VDT-I-Gen. 030 of 6.80

Re.: Motortester EFAW 268
268 S 10
269
214 B
AE 2000

1. General

Please make sure that the above-mentioned motortesters in your workshop and at your customers (e.g. motor vehicle workshops, oil companies, gas stations, vocational schools etc.) are converted. The conversion is subject to payment and is carried out by the K7 after-sales service of the responsible BG. The standard time is 15 work units (with fitting of switch).

2. Why motortester conversion?

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle as well as to incorrect triggering of the meter when testing the ignition system. There is, however, no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Since, with the above-listed motortesters, the timing light is triggered by the signal path dwell angle - meter, this incorrect triggering also leads to incorrect flashing and thus to an incorrect display of the advance angle.

3. Conversion measures

The situation is to be remedied by modifying the wiring of the testers so that the timing light is triggered by the clamp-on induction pickup and the pulse shaper stage.

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N10

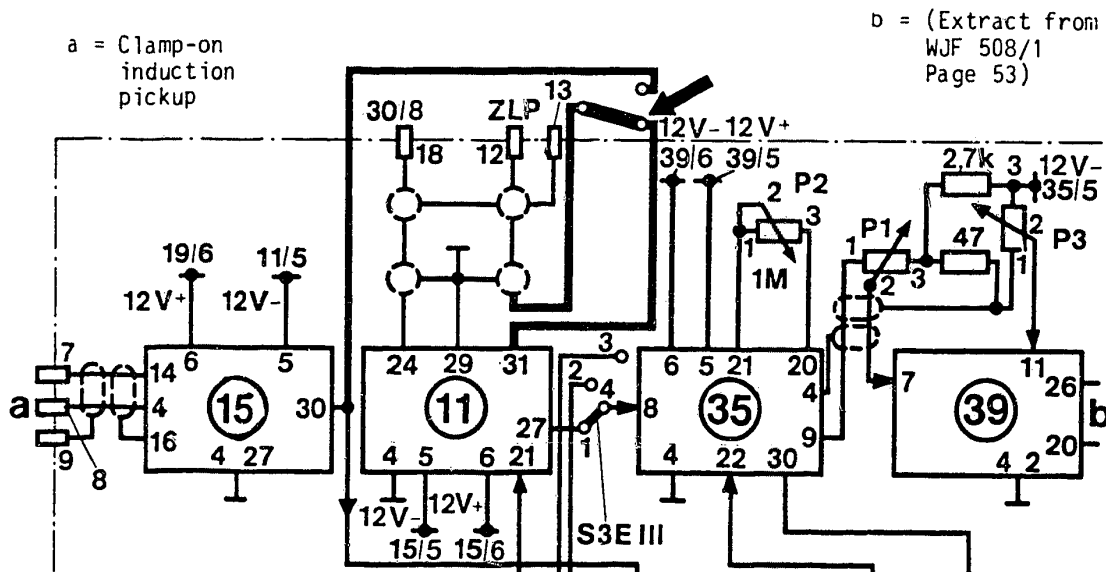
Motor Vehicle Service Information

Alfa Romeo



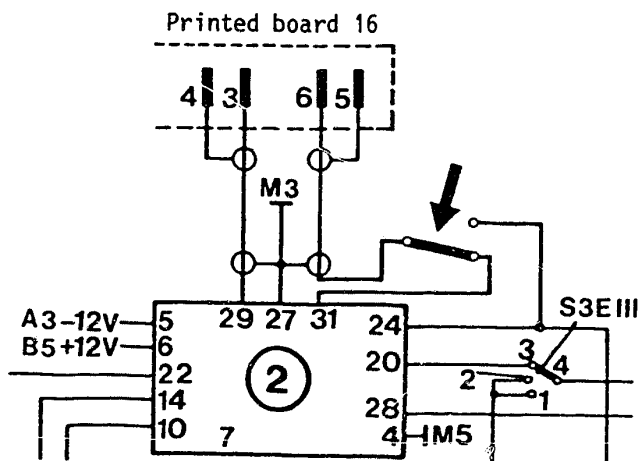
Remove the line of the ZLP* from pin 31 of printed board 11 (coupling stage) and connect to pin 30 of printed board 15 (pulse shaper stage) via a switch with change-over contact (e.g. 0 341 500 803). In addition, a new line must be connected from pin 31 of printed board 11 to the other contact of the switch with change-over contact. Arrow points to switch with change-over contact.

* ZLP = timing light



EFAW 214 B

Remove the line from terminal 6 of printed board 16 to pin 31 of printed board 2 (coupling stage) and connect to pin 24 of the same printed board via a switch with change-over contact (e.g. 0 341 500 803). In addition, a new line must be connected from pin 31 of printed board 2 to the other contact of the switch with change-over contact. Arrow points to switch with change-over contact.



(Extract from WJF 503/1, Page 64)

By fitting the switch with change-over contact in the front panel of the motor-tester, it is possible to switch over from standard ignition systems to those with current limitation. We recommend that the switch positions be marked correspondingly: e.g. "standard" - "current limitation". These conversion measures have already been published in the K7 information sheet KJF 28/7911.



4. Test instructions

4.1 Standard ignition systems

Switch position: "standard"

All other tester connections as per operating instructions.

4.2 Ignition systems with current limitation

Switch position: "current limitation"

In order to trigger the timing light, the induction-type pulse generator (clamp-on pickup or red pickup) must always be connected during the measurement.

The selector switch for ignition systems built into the motortester must be switched to standard coil ignition (not to TCI) with these ignition systems.

All other tester connections as per operating instructions.

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.



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TESTS ON ELECTRONIC IGNITION SYSTEMS
(TCI, TZ)
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En
3.1981

The following tests are listed in older and current Tester operating instructions or in Trouble-shooting with the oscillograph:

- "Separate ignition coil test" (concerns EFAW 213, 214, 268, AE 2000).
- Calculating the "ignition voltage reserve" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).
- "Intensified insulation test" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should not be carried out on transistorized ignition systems.

The contents of this Service Information has already been published in the K7-Information K7-VJF 17/8012.

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Motor Vehicle Service Information
Alfa Romeo



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